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Paul C. Freer.

OBITUARY

Paul Caspar Freer

DIRECTOR OF THE BUREAU OF SCIENCE OF THE GOVERNMENT OF THE PHILIPPINE ISLANDS
DEAN OF THE COLLEGE OF MEDICINE AND SURGERY AND PROFESSOR OF
CHEMISTRY OF THE UNIVERSITY OF THE PHILIPPINES, AND
FOUNDER AND EDITOR-IN-CHIEF OF THIS JOURNAL

We are deeply grieved to announce the death of Doctor Freer at Baguio, Philippine Islands, on April the seventeenth, in his fifty-first year, from arterio-sclerosis and acute nephritis.

In an effort formally to express our sorrow and to honor his memory a memorial meeting of the members of the Staff of the Bureau of Science, the Council of the University of the Philippines, and the members of the Philippine Islands Medical Association will be held on July 1, 1912. The proceedings of this memorial meeting will be published in a future number of this Journal.

At a meeting of the members of the Staff of the Bureau of Science, held on the eighteenth day of April, the following resolutions were adopted:

Whereas it has pleased Almighty God in His Wise and Inscrutable Providence to remove from our midst Paul Caspar Freer, M. D., Ph. D., Director of the Bureau of Science of the Government of the Philippine Islands, since the time of its organization as the Bureau of Government Laboratories in the year 1901, Dean of the College of Medicine and Surgery, and Professor of Chemistry, University of the Philippines, and Founder and Editor-in-Chief of the "Philippine Journal of Science," who, for many years, has been our Leader, Counselor, and Friend; and

Whereas at best we can do little to indicate at this time our real appreciation of him as a man and as a worker for the general good: Therefore be it

Resolved, That we, the Members of the Staff of the Bureau of Science in Manila, Philippine Islands, do hereby express our deepest sorrow and keen feeling of personal loss in the death of Doctor Freer; and be it further

Resolved, That he holds a place of highest respect, admiration and appreciation both officially and personally in the hearts of all of us, and especially of those who were most intimately associated with him in scientific work; and be it further

Resolved, That it is the sense of the Members of this Institution that the Bureau of Science has suffered a very great loss and that the cause of Science in these Islands has been deprived of one of its most zealous and conscientious advocates; and be it further

Resolved, That we extend our sincere sympathy and condolence to his Widow in her overwhelming grief, to his Sister, Brother and other Relatives; and be it further

Resolved, That copies of these resolutions be engrossed and sent to the bereaved Widow and Brother of Doctor Freer, and that they be filed in the Archives of the Bureau of Science, transmitted to the Bureau of Civil Service, published in the forthcoming Number of each Section of the "Philippine Journal of Science," in the newspapers of Manila, in a paper in the City of Chicago, Doctor Freer's birth-place, and in "Science," the Official Organ of the American Association for the Advancement of Science, of which Doctor Freer was a Fellow.

For the Staff of the Bureau of Science:

RICHARD P. STRONG,
CHARLES S. BANKS,
E. D. MERRILL,
[L. S.]
ALVIN J. COX,
OSCAR TEAGUE,
A. E. SOUTHARD,
Committee.

At Manila, Philippine Islands, this eighteenth day of April,
in the year of our Lord one thousand nine hundred and twelve.

THE PHILIPPINE

JOURNAL OF SCIENCE

D. GENERAL BIOLOGY, ETHNOLOGY
AND ANTHROPOLOGY

VOL. VII FEBRUARY, 1912 NO. 1

A LIST OF THE MAMMALS OF THE PHILIPPINE ISLANDS, EXCLUSIVE OF THE CETACEA.

By N. HOLLISTER.

(Assistant Curator, Division of Mammals, United States National Museum, Washington, D. C.[1]*)*

INTRODUCTION.

This list is based almost wholly on the published literature of the subject. Although the large collection of Philippine mammals in the United States National Museum has been of constant service, there has been no attempt at monographic or revisionary work on the specimens themselves. The list was first planned by Mr. Dean C. Worcester, who requested Mr. Gerrit S. Miller, curator of mammals, United States National Museum, to carry it out. Owing to more pressing work, it was impossible for Mr. Miller to take it up at present, and it was turned over to me. As the work progressed it seemed important to add several features not primarily planned, and as completed it forms several distinct parts.

The work is intended chiefly as a stimulus and help to collectors and travelers in the Islands, that they may be able to collect intelligently and to know the important species to be sought for or saved in certain localities. Doubtless hundreds of valuable specimens are annually lost to science through a lack of proper appreciation of the immense value of certain specimens from many localities. This is especially true of the larger mammals, the skulls alone of which, carefully labeled as to locality, are often of the greatest importance, and might be readily saved by sportsmen, even though it were impossible at the time to preserve the skins.

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[1] Published here by permission of the Secretary of the Smithsonian Institution.

The key to the families is purely artificial, and is based on Philippine species only. Easily discerned characters, chiefly external, or at least conspicuous in freshly-killed examples, are used whenever possible. It has been the chief aim to avoid technicalities as much as possible without destroying the working value of the key, that it may be serviceable to sportsmen and travelers, without special study of mammalian structure. The key refers to the pages in the list proper where the genera and species of the family are listed; and under each genus is given a brief synopsis of characters common to all the Philippine species. To make them more serviceable, by the use of the most conspicuous characters, these generic diagnoses, like the key itself, are based solely on Philippine species and are not intended for use outside the Islands. Many characters used will fail in species from other regions. The list proper is supposed to contain all the species described from or reported from the Islands, with a reference to the original description, the present generic combination, and all synonyms with type-localities in the Philippines. After this, is given the type-locality of the recognized form and a list of the islands from which it has been recorded in literature, with an authority for each record. After the list proper is a "Hypothetical list" of species apparently erroneously reported from the Islands by Casto de Elera, a list of type-localities in the Philippines, and a bibliography of papers dealing with Philippine mammalogy.

The time has not yet come to write more than a preliminary list of Philippine mammal names; and not until a thorough survey of the Islands is made, topotypes of all described forms assembled, and general collecting carried on in all localities, will it be possible to prepare a real manual of Philippine mammals.

U. S. NATIONAL MUSEUM, *July 1, 1911.*

LIST OF PHILIPPINE MAMMALS.

Artificial key to the families of Philippine mammals.

- Posterior limbs absent (dugong) .... **Dugongidæ**, p. 45.
- Posterior limbs present.
  - Toes furnished with hoofs.
    - Both sexes without horns.
      - Upper incisors present (pigs) .... **Suidæ**, p. 38.
      - Upper incisors wanting (mouse-deer) .... **Tragulidæ**, p. 39.
    - Males with horns.
      - Solid bony horns (antlers) in male only (deer) .... **Cervidæ**, p. 40.
      - Hollow horns in both sexes (caribao) .... **Bovidæ**, p. 45.
  - Toes furnished with claws or nails.
    - Upper parts covered with scales; teeth absent (pangolin). **Manidæ**, p. 35.
    - Upper parts without scales; teeth present.
      - Fore and hind limbs connected by a membrane for flying or "sailing."
        - Fingers not greatly elongated for support of flight membrane (parachute).
          - Feet webbed to nails (flying-lemur) .... **Galeopteridæ**, p. 7.
          - Feet not webbed (flying-squirrels) .... **Petauristidæ**, p. 25.
        - Fingers greatly elongated for support of flight membrane (true wing).
          - Index finger with three phalanges (fruit-bats) .. **Pteropidæ**, p. 7.
          - Index finger with less than three phalanges (bats).
            - Upper incisors absent .... **Megadermidæ**, p. 13.
            - Upper incisors present.
              - Tail not contained entirely within interfemoral membrane.
                - Tail extending beyond posterior end of the interfemoral membrane .... **Molossidæ**, p. 20.
                - Tail perforating upper surface of interfemoral membrane .... **Emballonuridæ**, p. 12.
              - Tail contained entirely within interfemoral membrane.
                - Ear with tragus .... **Vespertilionidæ**, p. 16.
                - Ear without tragus.
                  - Toes with two phalanges each ...... **Hipposideridæ**, p. 15.
                  - Toes (except hallux) with three phalanges each. **Rhinolophidæ**, p. 13.
      - Fore and hind limbs not connected by a membrane for flying or "sailing."
        - Front teeth chisel-shaped, separated from grinding teeth by a wide space (no canine teeth; gnawing animals).
          - Back furnished with long quills (porcupine) .... **Hystricidæ**, p. 34.
          - Back without quills.
            - With four or more grinding teeth in each jaw (squirrels). **Sciuridæ**, p. 24.
            - With two or three grinding teeth in each jaw (rats, etc.). **Muridæ**, p. 26.

- Front teeth not chisel-shaped, tooth row essentially continuous (canine teeth present).
  - Size small; length of head and body (to root of tail) less than 215 millimeters (8.5 inches).
    - Total length (nose to end of tail) under 250 millimeters (or 10 inches).
      - Fur short; color uniform unmixed brownish—or blackish-gray (true shrews) .... Soricidæ, p. 5.
      - Fur long; color variegated; slate gray mixed with reddish-brown .... Erinaceidæ, p. 4.
    - Total length (nose to end of tail) over 250 millimeters (or 10 inches).
      - Tail well haired (tree shrews) .... Tupaiidæ, p. 6.
      - Tail nearly naked (tarsier) .... Tarsiidæ, p. 36.
  - Size large; length of head and body (to root of tail) over 215 millimeters (or 8.5 inches).
    - Upper incisors four.
      - No external tail.
        - Size small; head and body less than 300 millimeters (or 1 foot) (slow lemur) .... Lemuridæ, p. 35.
        - Size large; head and body over 400 millimeters (or 16 inches) (gibbon) .... Hylobatidæ, p. 38.
      - With external tail, very short or very long (maccaque). Cercopithecidæ, p. 36.
    - Upper incisors six.
      - Hind foot with four toes (cats) .... Felidæ, p. 23.
      - Hind foot with five toes.
        - Upper molar-premolar row (all teeth back of the long canine tooth) of six teeth (civets and mongoose) .... Viverridæ, p. 22.
        - Upper molar-premolar row of less than six teeth.
          - Upper molar-premolar row of four teeth (otter, "skunk," etc.) .... Mustelidæ, p. 20.
          - Upper molar-premolar row of five teeth.
            - Ears tufted; throat and breast blackish (binturong or bear-cat) .... Viverridæ, p. 22.
            - Ears not tufted; throat and breast yellowish (marten) .... Mustelidæ, p. 20.

Order INSECTIVORA.

Family ERINACEIDÆ.

Genus PODOGYMNURA Mearns.

1905. *Podogymnura* MEARNS, Proc. U. S. Nat. Mus., **28**, **436**.
Type.—*Podogymnura truei* MEARNS.

A small, rat-like wood-shrew; pelage long, full, and soft. Upper parts slate-gray mixed with coarse reddish-brown hairs; under parts, hoary, slightly mixed with brown hairs. Head and body, 148 millimeters; tail, 62; hind foot, 36. Only one specimen known.

Podogymnura truei Mearns.

1905. *Podogymnura truei* MEARNS, Proc. U. S. Nat. Mus., 28, 437.

Type locality.—Mount Apo, Mindanao; 1,829 meters. Mindanao (Mearns).

Family SORICIDÆ.

Genus **PACHYURA** Sélys-Longchamps.

1839. *Pachyura* SÉLYS-LONGCHAMPS, Études de micro-mammalogie, 32. *Type.*—*Crocidura etrusca* BONAPARTE (= *Sorex etruscus* SAVI).

Mouse-like shrews, with short, uniformly colored brownish-gray coat. Four small conical teeth behind each anterior upper incisor. Length of head and body, in Philippine species, over 110 millimeters.

Pachyura edwardsiana (Trouessart).

1880. *Crocidura edwardsiana* TROUESSART, Le Naturaliste, No. 42, 330, December 15.

Type locality.—Sulu. Sulu (Trouessart).

Pachyura luzoniensis (Peters).

1871. *Crocidura* (*P.*) *luzoniensis* PETERS, Monatsb. Königl. Preuss. Akad. Wiss. Berlin (1870), 595.

Type locality.—Luzon. Cebu (Günther); Luzon (Peters).

Genus **CROCIDURA** Wagler.

1832. *Crocidura* WAGLER, Isis von Oken, 275. *Type.*—*Sorex leucodon* HERMANN.

Small mouse-like shrews; usually darker colored than *Pachyura*, dark brownish-black. Three small conical teeth behind each anterior upper incisor. Length of head and body less than 100 millimeters.

Crocidura beatus Miller.

1910. *Crocidura beatus* MILLER, Proc. U. S. Nat. Mus., 38, 392, August 19.

Type locality.—Mount Bliss, Mindanao; 1,753 meters. Mindanao (Miller).

Crocidura grandis Miller.

1910. *Crocidura grandis* MILLER, Proc. U. S. Nat. Mus., 38, 393, August 19.

Type locality.—Grand Malindang Mountain, Mindanao; 1,753 meters. Mindanao (Miller).

Crocidura grayi Dobson.

1890. *Crocidura grayi* DOBSON, Ann. and Mag. Nat. Hist., VI, 6, 494.

Type locality.—Philippine Islands. Luzon (Miller).

Crocidura halconus Miller.

1910. *Crocidura halconus* Miller, Proc. U. S. Nat. Mus., 38, 391, August 19.

Type locality.—Mount Halcon, Mindoro; 1,920 meters. Mindoro (Miller).

Crocidura mindorus Miller.

1910. *Crocidura mindorus* Miller, Proc. U. S. Nat. Mus., 38, 392, August 19.

Type locality.—Mount Halcon, Mindoro; 1,920 meters. Mindoro (Miller).

Family TUPAIIDÆ.

Genus TUPAIA Raffles.

1822. *Tupaia* Raffles, Trans. Linn. Soc. London, 13, pt. 1, 256. *Type.*—*Tupaia ferruginea* Raffles.

Tree-shrews with general appearance of small squirrels, but muzzle without whiskers; tail long-haired and flattened; head pointed; ears rounded. Coloration variegated reddish, grayish, or buffy. Head and body about 155 millimeters; tail about 166.

Tupaia cuyonis Miller.

1910. *Tupaia cuyonis* Miller, Proc. U. S. Nat. Mus., 38, 693, August 19.

Type locality.—Cuyo. Cuyo (Miller).

Tupaia ferruginea palawanensis Thomas.

1894. *Tupaia ferruginea palawanensis* Thomas, Ann. and Mag. Nat. Hist., VI, 13, 367.

Type locality.—Palawan. Palawan (Thomas).

Tupaia möllendorffi Matschie.

1898. *Tupaja möllendorffi* Matschie, Sitz.-ber. Ges. Nat. Freunde Berlin (1898), No. 5, 39, May.

Type locality.—Culion. Culion (Matschie).

Genus UROGALE Mearns.

1905. *Urogale* Mearns, Proc. U. S. Nat. Mus. 28, 435. *Type.* *Urogale cylindrura* Mearns.

Like *Tupaia* but larger, with tail short-haired and more cylindrical. Colors dark brown, usually with an indistinct ferruginous stripe over each shoulder. Head and body about 200 millimeters; tail about 100.

Urogale cylindrura Mearns.

1905. *Urogale cylindrura* MEARNS, Proc. U. S. Nat. Mus., 28, 435.

Type locality.—Village of Todaya, Mount Apo, Mindanao; 1,219 meters. Mindanao (Mearns).

Urogale everetti (Thomas).

1892. *Tupaia everetti* THOMAS, Ann. and Mag. Nat. Hist. VI, 9, 250, March.
1905. *Urogale everetti* MEARNS, Proc. U. S. Nat. Mus., 28, 435.

Type locality.—Zamboanga, Mindanao. Mindanao (Thomas).

Order DERMOPTERA.

Family GALEOPTERIDÆ.

Genus CYNOCEPHALUS Boddaërt.

1768. *Cynocephalus* BODDAËRT, Dierk. Meng., 2, 8, footnote 1. *Type.*—*Cynocephalus volans*=*Lemur volans* LINNÆUS.

"Flying-lemur." Fore and hind limbs and tail connected by a broad expansion of skin forming a parachute; feet fully webbed. Colors marbled gray and brown. Size of a small domestic cat; head and body about 400 millimeters.

Cynocephalus volans (Linnæus).

1758. *Lemur volans* LINNÆUS, Syst. Nat., 10 ed., 1, 30.
1768. *Cynocephalus volans* BODDAËRT, Dierk. Meng., 2, 8, footnote 1.
1838. *Galeopithecus philippinensis* WATERHOUSE, Proc. Zool. Soc. London, 119. (South of Manila, Luzon.)

Type locality.—Pampanga, southern Luzon [see Thomas, *Proc. Zool. Soc. London* (1911), 130]. Basilan (Steere); Bohol (Thomas); Dinagat (Günther); Leyte (Thomas); Mindanao (Steere); Samar (Thomas).

Order CHIROPTERA.

Family PTEROPIDÆ.

Genus CYNOPTERUS F. Cuvier.

1825. *Cynopterus* F. CUVIER, Des Dents des Mammifères, 248. *Type.*—*Pteropus marginatus* GEOFFROY.

Rather small fruit-bats with very short tails, the terminal half free from interfemoral membrane; second finger with well developed claw; nostrils prominent, almost tubular; upper lip divided by a deep, narrow, vertical groove. Color variable. Head and body about 110 millimeters.

Cynopterus luzoniensis (Peters).

1862. *Pachysoma luzoniense* PETERS, Monatsb. Königl. Preuss. Akad. (1861), 708.
1870. *Cynopterus marginatus* var. *philippensis* GRAY, Cat. Monk., Lemurs, and Fruit-eat. Bats, 123. (Philippines.)
1870. *Cynopterus marginatus* var. *cumingii* GRAY, Cat. Monk., Lemurs, and Fruit-eat. Bats, 123. (Philippines.)
1899. *Cynopterus luzoniensis* MATSCHIE, Megachiroptera des Berliner Mus., 76.

Type locality.—East slope of Volcano Yriga, Camarines, Luzon. Luzon (Peters).

Genus THOOPTERUS Matschie.

1899. *Thoopterus* MATSCHIE, Flederm. des Berliner Mus. für Naturk., 77. *Type.*—*Cynopterus marginatus* var. *nigrescens* GRAY.

Like *Cynopterus,* but with cheek teeth greatly enlarged, the crowns almost square; tail shorter, concealed in the fur. General color dark brown.

Thoopterus nigrescens (Gray).

1870. *Cynopterus marginatus* var. *nigrescens* GRAY, Cat. Monk., Lemurs, and Fruit-eat. Bats, 123.
1878. *Cynopterus latidens* DOBSON, Cat. Chiropt., 86.
1895. *Cynopterus latidens* ELERA, Cat. Syst. Faun. Filipinas, 1, 7.
1907. *Thoopterus nigrescens* MILLER, Bull. U. S. Nat. Mus., No. 57, 50.

Type locality.—Morty Island, Malay Archipelago. Luzon (Elera).

Genus PTENOCHIRUS Peters.

1862. *Ptenochirus* PETERS, Monatsb. Königl. Preuss. Akad. (1861), 707. *Type.*—*Pachysoma* (*Ptenochirus*) *jagorii* PETERS.

Like *Cynopterus,* but with inner pair of lower incisors absent (incisors 4/2); outer upper incisors shorter than middle ones. Color above dark brown, below paler. Head and body, 103 millimeters.

Ptenochirus jagorii (Peters).

1862. *Pachysoma* (*Ptenochirus*) *jagorii* PETERS, Monatsb. Königl. Preuss. Akad. (1861), 707.
1899. *Ptenochirus jagori* MATSCHIE, Megachiroptera des Berliner Mus., 79.

Type locality.—Daraga, Albay, Luzon. Luzon (Peters); Mindanao (Trouessart); Mindoro (Trouessart).

Genus ROUSETTUS Gray.

1821. *Rousettus* GRAY, London Med. Rep., 15, 299, April 1. *Type.*—*Pteropus aegyptiacus* GEOFFROY.

Medium sized fruit-bats (Philippine species, head and body about 127 millimeters). Muzzle long; second finger with well developed claw; tail about 16 millimeters long. Color varying from dark brown to yellowish-brown.

Rousettus amplexicaudatus (Geoffroy).

1810. *Pteropus amplexicaudatus* GEOFFROY, Ann. Mus. d'Hist. Nat. 15, 96.

1870. *Eleutherura philippinensis* GRAY, Cat. Monk., Lemurs, and Fruit-eat. Bats, 119. (Manila, Luzon.)

1904. *Rousettus amplexicaudatus* TROUESSART, Cat. Mamm., Suppl., 60.

Type locality.—Timor Island. Guimarás (Steere); Luzon (Thomas); Negros (Elliot); Samar (Peters).

Genus **PTEROPUS** Brisson.

1762. *Pteropus* BRISSON, Regn. Anim., 2 ed., 13. *Type.—Vespertilio vampyrus* LINNÆUS.

Large fruit-bats (one species the largest bat known). Tail absent; interfemoral membrane narrow; calcar well developed; well developed claw on index finger. Fur of nape of neck and shoulders differing in color or quality from that of back.

Pteropus cagayanus Mearns.

1905. *Pteropus cagayanus* MEARNS, Proc. U. S. Nat. Mus., 28, 433.

Type locality.—Cagayan Sulu. Cagayan Sulu (Mearns).

Pteropus hypomelanus hypomelanus Temminck.

1853. *Pteropus hypomelanus* TEMMINCK, Esquiss. Zool. sur la Côte de Guiné, 61.

Type locality.—Ternate. Dinagat (Günther); Guimarás (Elliot); Leyte (Steere); Mindanao (Günther); Panay (Steere).

Pteropus leucopterus Temminck.

1853. *Pteropus leucopterus* TEMMINCK, Esquiss. Zool. sur la Côte de Guiné, 60.

1870. *Pteropus chinensis* GRAY, Cat. Monk., Lemurs, and Fruit-eat. Bats, 111. [Probably Luzon, see Andersen, Ann. and Mag. Nat. Hist. (1909), VIII, 3, 213, footnote.]

Type locality.—Philippine Islands. Cagayan (Elera); Luzon (Andersen).

Pteropus pumilus Miller.

1910. *Pteropus pumilus* MILLER, Proc. U. S. Nat. Mus., 38, 394, August 19.

Type locality.—Palmas Island, southeast of Mindanao. Palmas (Miller).

Pteropus speciosus Andersen.

1908. *Pteropus speciosus* ANDERSEN, Ann. and Mag. Nat. Hist., VIII, 2, 364, October.

Type locality.—Malanipa Island, off Zamboanga. Malanipa (Andersen); Sibutu (Andersen).

Pteropus vampyrus lanensis Mearns.

1905. *Pteropus lanensis* MEARNS, Proc. U. S. Nat. Mus., 28, 432.
1908. *Pteropus vampyrus lanensis* ANDERSEN, Ann. and Mag. Nat. Nat. Hist., VIII, 2, 368, October.

Type locality.—Pantar, near Lake Lanao, Mindanao; 581 meters. Catanduanes (Thomas); Cebu (Elera); Dinagat (Günther); Leyte (Elliot); Luzon (Matschie); Mindanao (Mearns); Negros (Steere); Palawan (U. S. N. M.); Panay (Steere); Rasal (Günther); Samar (Peters).

Genus ACERODON Jourdan.

1837. *Acerodon* JOURDAN, L'Echo du Monde Savant et l'Hermès, 4, No. 275, 156, October 14. *Type.*—*Pteropus jubatus* ESCHSCHOLTZ.

Large fruit-bats; like *Pteropus*, but with smaller canines and larger, more complex molariform teeth. Middle pair of lower incisors much smaller than the outer incisors. Forearm from 165 to 205 millimeters.

Acerodon jubatus jubatus (Eschscholtz).

1831. *Pteropus jubatus* ESCHSCHOLTZ, Zool. Atlas, 4, 1, pl. 16.
1833. *Pteropus pyrrhocephalus* MEYEN, N. Act. Acad. Cæs. Leop.-Car., 16, pt. 2, 604, pls. 45–46. (Manila, Luzon.)
1896. *Pteropus auri-nuchalis* ELLIOT, Field Col. Mus. Pub. Zool., 1, No. 3, 77, May. (Leyte.)
1896. *Acerodon jubatus* HEUDE, Mém. Hist. Nat. Emp. Chinois, 3, 177.

Type locality.—Manila, Luzon. Dinagat (Andersen); Leyte (Andersen); Luzon (Andersen); Negros (Andersen); Panay (Elliot).

Acerodon jubatus mindanensis Andersen.

1909. *Acerodon jubatus mindanensis* ANDERSEN, Ann. and Mag. Nat. Hist., VIII, 3, 26.

Type locality.—Mindanao. Mindanao (Andersen).

Acerodon lucifer (Elliot).

1896. *Pteropus lucifer* ELLIOT, Field Col. Mus. Pub. Zool., 1, No. 3, 78, May.
1909. *Acerodon lucifer* ANDERSEN, Ann. and Mag. Nat. Hist., VIII, 3, 24, January.

Type locality.—Concepcion, Panay. Panay (Elliot).

Genus HYPODERMIS Blythe.

1828. *Hypoderma* GEOFFROY, Dict. Class. Hist. Nat., 14, 706, (not *Hypoderma* LATREILLE, 1825).
1840. *Hypodermis* BLYTHE, Cuvier's Anim. Kingd., 69. *Type.*—*Cephalotes peronii* GEOFFROY.
1898. *Dobsonia* PALMER, Proc. Biol. Soc. Wash., 12, 114, April 30.

Medium sized fruit-bats. No claw on index finger; tail well developed; two upper and two lower incisors only. Head and shoulders well clothed with blackish fur; posterior half of body nearly naked. Head and body about 165 milimeters.

Hypodermis peronii (Geoffroy).

1810. *Cephalotes peronii* GEOFFROY, Ann. Mus. d'Hist. Nat. 15, 104.

Type locality.—Timor Island. Samar (Trouessart).

Genus MACROGLOSSUS Schinz.

1824. *Macroglossus* SCHINZ, Naturgesch. und Abbild. Säugeth., 71. *Type.—Pteropus rostratus* HORSFIELD=*Macroglossus minimus* (GEOFFROY).

Small reddish-brown fruit-bats; body entirely furred; well developed claw on index finger; no external tail. Head and body less than 100 millimeters.

Macroglossus lagochilus Matschie.

1899. *Macroglossus lagochilus* MATSCHIE, Megachiroptera des Berliner Mus., 97.

Type locality.—Buru. Cuyo (Elera); Negros (Thomas); Panay (Elera); Samar (Elera); Tablas (Matschie).

Genus ODONTONYCTERIS Jentink.

1902. *Odontonycteris* JENTINK, Notes from Leyden Mus., 23, No. 3, 140, July 15. *Type.—Odontonycteris meyeri* JENTINK.

Like *Macroglossus* in external characters, but upper and lower molar-premolar rows of six teeth (an additional upper molar over *Macroglossus*).

Odontonycteris meyeri Jentink.

1902. *Odontonycteris meyeri* JENTINK, Notes from Leyden Mus., 23, No. 3, 140, July 15.

Type locality.—Great Sangi Island. Cagayan Sulu (Miller).

Genus HARPYIONYCTERIS Thomas.

1896. *Harpyionycteris* THOMAS, Ann. and Mag. Nat. Hist., VI, 18, 243, September. *Type.—Harpyionycteris whiteheadi* THOMAS.

Medium sized fruit-bats (head and body 140 millimeters). No tail; claw on index finger present; legs unusually short. General color above and below uniform chocolate-brown. Only one specimen known.

Harpyionycteris whiteheadi Thomas.

1896. *Harpyionycteris whiteheadi* THOMAS, Ann. and Mag. Nat. Hist., VI, 18, 244, September.

Type locality.—Mindoro. Mindoro (Thomas).

Family EMBALLONURIDÆ.

Genus EMBALLONURA Temminck.

1838. *Emballonura* TEMMINCK, Van der Hoven's Tijdschrift Nat. Gesch. en Physiol., 5, 22. *Type.—Emballonura monticola* TEMMINCK.

Small insectivorous bats; proximal phalanx of third finger flexed on dorsal surface of metacarpal when at rest; muzzle without special cutaneous outgrowths; tragus present; eyes large, rather prominent. Tail perforates the interfemoral membrane and appears on its upper surface distinctly back from edge. Upper incisors four. Head and body about 38 millimeters.

Emballonura monticola Temminck.

1838. *Emballonura monticola* TEMMINCK, Van der Hoven's Tijdschrift Nat. Gesch. en Physiol., 5, 25.

1839. *Vespertilio (Nycticeus) alecto* EYDOUX AND GERVAIS, Voyage autour du Monde, 5, pt. 2, 7. (Manila, Luzon.)

1862. *Emballonura discolor* PETERS, Monatsb. Königl. Preuss. Akad. (1861), 711. (Paracali, Luzon.)

Type locality.—Java. Luzon (Dobson).

Genus TAPHOZOUS Geoffroy.

1813. *Taphozous* GEOFFROY, Descr. de l'Egypte, 2, 113. *Type. Taphozous perforatus* GEOFFROY.

Philippine species larger than *Emballonura*, with short muzzle, deep hollow between eyes, and tail perforating interfemoral membrane, free for at least 10 millimeters. Colors brown or black, frequently marbled with lighter. Upper incisors two. Proximal phalanx of third finger flexed on dorsal surface of metacarpal when at rest, as in *Emballonura*.

Taphozous philippinensis Waterhouse.

1845. *Taphozous philippinensis* WATERHOUSE, Proc. Zool. Soc. London, Jan. 14, (1845), 9, April.

Type locality.—Philippine Islands. Luzon (Matschie); Mindanao (Hoffman).

Taphozous pluto Miller.

1910. *Taphozous pluto* MILLER, Proc. U. S. Nat. Mus., 38, 396, August 19.

Type locality.—Mercedes, 15 kilometers east of Zamboanga, Mindanao. Mindanao (Miller); Luzon (Miller).

Family MEGADERMIDÆ.

Genus MEGADERMA Geoffroy.

1810. *Megaderma* GEOFFROY, Ann. Mus. d'Hist. Nat., 15, 187. *Type.*—*Vespertilio spasma* LINNÆUS.

Bats with long, erect nose-leaf, very short tails, and large ears with bifid tragus; no upper incisor teeth. Color brownish-gray or slaty. Head and body about 87 millimeters.

Megaderma spasma spasma (Linnæus).
1758. *Vespertilio spasma* LINNÆUS, Syst. Nat. 10 ed., 1, 32.
1810. *Megaderma spasma* GEOFFROY, Ann. Mus. d'Hist. Nat., 15, 195.
1843. *Megaderma philippinensis* WATERHOUSE, Proc. Zool. Soc. London, 69. (Philippine Islands.)

Type locality.—Ternate [See Andersen and Wroughton, *Ann. and Mag. Nat. Hist.* (1907), VII, 19, 132]. Luzon (Sanchez); Mindanao (Dobson).

Family RHINOLOPHIDÆ.

Genus RHINOLOPHUS Lacépède.

1799. *Rhinolophus* LACÉPÈDE, Tabl. des Div. Sousdiv. Ordres et Genres Mamm., 15. *Type.*—*Vespertilio ferrum-equinum* SCHREBER.

Small bats with conspicuous nose-leaves; large ears without tragus. Tail well developed, contained entirely within the interfemoral membrane.

Rhinolophus anderseni Cabrera.
1909. *Rhinolophus anderseni* CABRERA, Bol. de la Real Soc. Española de Hist. Nat., 305 (306 in separate), June.

Type locality.—Philippines, probably Luzon. (?) Luzon (Cabrera).

Rhinolophus virgo Andersen.
1905. *Rhinolophus virgo* ANDERSEN, Proc. Zool. Soc. London, May 16, (1905), 88, October.

Type locality.—South Camarines, Luzon. Luzon (Andersen).

Rhinolophus philippinensis Waterhouse.
1843. *Rhinolophus philippinensis* WATERHOUSE, Proc. Zool. Soc. London, 68.

Type locality.—Luzon [see Anderson, *Ann. and Mag. Nat. Hist.* (1905), 16, 254]. Luzon (Peters); Mindanao (Hoffman).

Rhinolophus luctus Temminck.

1841. *Rhinolophus luctus* Temminck, Monog. des Mamm., 2, 24.

Type locality.—Tapos, Java. Palawan (Elera).

Recorded by Elera from various islands in the Philippine group. Andersen, *Ann. and Mag. Nat. Hist.* (1905), VII, 16, 252, says that he has seen no bats of the *luctus* style from the Philippines. As this form is found in Borneo, Elera's record from Palawan seems worth retaining for the present.

Rhinolophus rufus Eydoux and Gervais.

1839. *Rhinolophus luctus* varietas *rufa* Eydoux and Gervais, Voyage autour du Monde, 5, pt. 2, 9.

1870. *Aquias eudouxii* Fitzinger, Sitz.-ber. Akad. Wien, 61, 194, February. (New name for *Rh. luctus rufus* Eydoux and Gervais.)

Type locality.—Manila, Luzon. Luzon (Eydoux and Gervais).

Usually placed in the synonymy of *R. luctus.* Andersen, *Ann. and Mag. Nat. Hist.* (1905), 16, 252, says that it is possibly an earlier name for *R. philippinensis,* and he has seen no bats of the *luctus* style from the Philippines. Until more *Rhinolophi* from Luzon are examined, it seems best to retain it in the list.

Rhinolophus hirsutus Andersen.

1905. *Rhinolophus hirsutus* Andersen, Ann. and Mag. Nat. Hist. VII, 16, 289, September.

Type locality.—Guimarás Island, P. I. Guimarás (Andersen).

Rhinolophus arcuatus arcuatus Peters.

1872. *Rhinolophus arcuatus* Peters, Monatsb. Königl. Preuss. Akad., June, (1871), 305.

Type locality.—Luzon. Luzon (Andersen).

Rhinolophus arcuatus exiguus Andersen.

1905. *Rhinolophus arcuatus exiguus* Andersen, Ann. and Mag. Nat. Hist., VII, 16, 283, September.

Type locality.—Zamboanga, Mindanao. Guimarás (Andersen); Mindanao (Andersen).

Rhinolophus subrufus Andersen.

1862. *Rhinolophus rufus* Peters, Monatsb. Königl. Preuss. Akad. (1861), 710. (Paracali, Luzon.) Not *Rhinolophus luctus* varietas *rufa* Eydoux and Gervais 1839.

1905. *Rhinolophus subrufus* Andersen, Ann. and Mag. Nat. Hist., VII, 16, 283, September.

Type locality.—Manila, Luzon. Luzon (Andersen); Mindanao (Andersen); Tablas (Matschie).

Rhinolophus inops Andersen.

1905. *Rhinolophus inops* ANDERSEN, Ann. and Mag. Nat. Hist., VII, 16, 284, September.

Type locality.—Mount Apo, at Todaya, Mindanao; 1,219 meters. Mindanao (Andersen).

Family HIPPOSIDERIDÆ.

Genus HIPPOSIDEROS Gray.

1831. *Hipposideros* GRAY, Zool. Misc., 37. *Type.*—*Vespertilio speoris* SCHREBER.

Small bats, with well developed tail and ears; resembling *Rhinolophus,* but toes with two phalanges each and lower molar-premolar series of five teeth, instead of six as in *Rhinolophus* (third lower premolar absent).

Hipposideros antricola (Peters).

1862. *Phyllorhina antricola* PETERS, Monatsb. Königl. Preuss. Akad. (1861), 709.

1898. *Hipposideros antricola* MATSCHIE, Sitz.-ber. Ges. Nat. Freunde Berlin, No. 5, 39, May.

Type locality.—Paracali, Luzon. Luzon, (Matschie).

Hipposideros bicolor (Temminck).

1841. *Rhinolophus bicolor* TEMMINCK, Monog. des Mamm., 2, 18.

1904. *Hipposiderus bicolor* TROUESSART, Cat. Mamm., Suppl., 72.

Type locality.—Java, Amboina, and Timor. Luzon (Peters); Palawan (Elera).

Hipposideros coronatus (Peters).

1872. *Phyllorhina coronata* PETERS, Monatsb. Königl. Preuss. Akad., June, (1871), 327.

1904. *Hipposiderus coronata* TROUESSART, Cat. Mamm., Suppl., 72.

Type locality.—Mainit, Mindanao. Mindanao (Peters); Palawan (Elera); Samar (Elera).

Hipposideros diadema griseus (Meyen).

1833. *Rhinolophus griseus* MEYEN, Nov. Act. Ac. Cæs. Leop.-car., 16, pt. 2, 608, pl. 46.

1905. *Hipposiderus diadema griseus* ANDERSEN, Ann. and Mag. Nat. Hist., VII, 16, 497, November.

Type locality.—S. Matheo Cave, Luzon [Andersen, *Ann. and Mag. Nat. Hist.* (1905), VII, 16, 497]. Catanduanes (Andersen); Guimarás (Andersen); Leyte (Andersen); Luzon (Andersen); Mindanao (Andersen).

Hipposideros obscurus (Peters).

1862. *Phyllorhina obscura* PETERS, Monatsb. Königl. Preuss. Akad. (1861), 709.
1904. *Hipposiderus obscura* TROUESSART, Cat. Mamm., Suppl., 72.

Type locality.—Paracali, Luzon. Dinagat (Günther); Luzon (Peters); Mindanao (Elera).

Hipposideros pygmæus Waterhouse.

1843. *Rhinolophus pygmæus* WATERHOUSE, Proc. Zool. Soc. London (1843), 67.
1904. *Hipposiderus pygmæa* TROUESSART, Cat. Mamm., Suppl., 71.

Type locality.—Philippine Islands. Luzon (Elera; specimens also in United States National Museum).

Genus **CHILOPHYLLA** Miller.

1910. *Chilophylla* MILLER, Proc. U. S. Nat. Mus. 38, 395, August 19. *Type.*—*Chilophylla hirsuta* MILLER.

A small bat with very large, funnel-shaped ears and unusually long soft fur. Nose-leaf inconspicuous except for the two lappets projecting over upper lip. Tail very short. General color light brown. Head and body, 33 millimeters. Only one specimen known.

Chilophylla hirsuta Miller.

1910. *Chilophylla hirsuta* MILLER, Proc. U. S. Nat. Mus., 38, 395, August 19.

Type locality.—Alag River, opposite mouth of Egbert River, Mindoro. Mindoro (Miller).

Family VESPERTILIONIDÆ.

Genus **MYOTIS** Kaup.

1829. *Myotis* KAUP, Skizzirte Entw.-Gesch. u. Natürl. Syst. d. Europ. Thierw., 1, 106. *Type.*—*Vespertilio myotis* BECHSTEIN.

Small bats with simple muzzles and lips. Tail long; ear well developed with slender tragus. Interfemoral membrane large, its surface furred at extreme base below. Teeth, 38.

Myotis formosus (Hodgson).

1835. *Vespertilio formosa* HODGSON, Journ. Asiatic Soc. Bengal, 4, 700.
1845. *Vespertilio rufo-pictus* WATERHOUSE, Proc. Zool. Soc. London, Jan. 14, (1845), 3, April. (Philippine Islands.)
1904. *Myotis formosus* TROUESSART, Cat. Mamm., Suppl., 91.

Type locality.—Central Nipal. Luzon (Elera).

Myotis macrotarsus (Waterhouse).

1845. *Vespertilio macrotarsus* WATERHOUSE, Proc. Zool. Soc. London. (1845), 3, April.

1904. *Myotis macrotarsus* THOMAS, Trans. Zool. Soc. London, 14, pt. 6, 385.

Type locality.—Philippine Islands. Luzon (Thomas); Mindoro (Elera).

Genus PIPISTRELLUS Kaup.

1829. *Pipistrellus* KAUP, Skizzirte Entwick.-Gesch. u. Natürl. Syst. d. Europ. Thierw., 1, 98. *Type.*—*Vespertilio pipistrellus* SCHREBER.

Externally much as in *Myotis;* ear usually shorter and broader, and tragus less acutely pointed; teeth, 34 (38 in *Myotis*). Size small; head and body, 40 to 45 millimeters.

Pipistrellus imbricatus (Horsfield).

1824. *Vespertilio imbricatus* HORSFIELD, Zool. Res. in Java (pages not numbered).

1898. *Pipistrellus imbricatus* THOMAS, Trans. Zool. Soc. London, 14, pt. 6, 385.

Type locality.—Java. Luzon (Thomas).

Pipistrellus irretitus (Cantor).

1842. *Vespertilio irretitus* CANTOR, Ann. and Mag. Nat. Hist., 9, 481.

1845. *Vespertilio meyeni* WATERHOUSE, Proc. Zool Soc. London, Jan. 14, (1845), 3, April. (Philippine Islands.)

Type locality.—Chusan Island, China. Luzon (Elera).

Pipistrellus tenuis (Temminck).

1841. *Vespertilio tenuis* TEMMINCK, Monog. des Mamm., 2, 229.

Type locality.—Java and Sumatra. (?) Mindanao (Hoffman).

Genus TYLONYCTERIS Peters.

1872. *Tylonycteris* PETERS, Monatsb. Königl. Preuss. Akad. Wiss., 703. *Type.*—*Vespertilio pachypus* TEMMINCK.

Very small bats (head and body about 40 millimeters; tail about 25) with head greatly flattened (depth of braincase barely one-half of mastoid width); ears normal, with small tragus; color golden-brown.

Tylonycteris pachypus (Temminck).

1841. *Vespertilio pachypus* TEMMINCK, Monog. de Mamm., 2, 217.

1872. *Tylonycteris pachypus* PETERS, Monatsb. Königl. Preuss. Akad. Wiss., 704.

Type locality.—Java and Sumatra. Cebu (Elera); Luzon (Dobson); Mindanao (Hoffman); Negros (Elera).

Genus SCOTOPHILUS Leach.

1821. *Scotophilus* LEACH, Trans. Linn. Soc. London, 13, 69. *Type.—Scotophilus kuhlii* LEACH.

Medium-sized bats (single Philippine species with head and body about 75 millimeters; tail about 50) varying in color from olive-brown to rich chestnut. Ears rather small with long, sharply-pointed tragus. Wing membrane attached to side of foot near base of toes. Wing and interfemoral membrane entirely naked above.

Scotophilus temminckii (Horsfield).

1824. *Vespertilio temminckii* HORSFIELD, Zool. Res. in Java (pages not numbered).

1838. *Scotophilus temminckii* GRAY, Mag. Zool. and Bot., 2, 497.

Type locality.—Java. Luzon (Peters); Negros (Elera); Panay (Elliot).

Genus MINIOPTERUS Bonaparte.

1837. *Miniopterus* BONAPARTE, Iconagr. della Fauna Italica, 1, fasc. XX. *Type.—Vespertilio ursinii* BONAPARTE=*V. schreibersii* KUHL.

Tail as long as head and body, wholly contained within the interfemoral membrane; ears small; tragus high, slender, slightly curved forward at tip; nostrils simple. Color variable. Head and body 45 to 60 millimeters.

Miniopterus australis Tomes.

1858. *Miniopterus australis* TOMES, Proc. Zool. Soc. London (1858), 125.

Type locality.—Australia. Luzon (Peters).

Miniopterus pusillus Dobson.

1876. *Miniopterus pusillus* DOBSON, Monog. Asiatic Chiropt., 162.

Type locality.—India or Philippine Islands. Luzon (Thomas); Mindanao (Hoffman).

Miniopterus schreibersii (Kuhl).

1819. *Vespertilio schreibersii* KUHL, Neue Ann. der Gesell. Wetterau., 1, pt. 2, 185.

1840. *Miniopterus schreibersii*, KEYSERLING AND BLASIUS, Wirbelth. Europ., 45.

1845. *Vespertilio eschscholtzii* WATERHOUSE, Proc. Zool. Soc. London, Jan 14, (1845), 3, April. (Philippine Islands.)

Type locality.—Hungary. Luzon (Peters); Samar (Sanchez).

Miniopterus tibialis (Tomes).

1858. *Vesp*[*ertilio*] *tibialis* TOMES, Proc. Zool. Soc. London (1858), 126.

1878. *Miniopterus tibialis* DOBSON, Cat. Chiropt. Brit. Mus., 348, in synonymy.

Type locality.—Amboyna. Luzon (Matschie).

Miniopterus tristis (Waterhouse).

1845. *Vespertilio tristis* WATERHOUSE, Proc. Zool. Soc. London (1845), 3, April.
1858. *Miniopterus tristis* TOMES, Proc. Zool. Soc. London (1858), 124.

Type locality.—Philippine Islands. Cebu (Elera); Luzon (Peters); Samar (Elera).

Genus MURINA Gray.

1842. *Murina* GRAY, Ann. and Mag. Nat. Hist., 10, 258, December.
Type.—*Vespertilio suillus* TEMMINCK.

Ears nearly circular; tragus long, tapering to a fine point. Wing membrane attached along the whole length of outer toe to the base of claw, extreme tip of tail free; upper surface of interfemoral membrane covered with hair. Head and body about 43 millimeters; tail about 37.

Murina cyclotis Dobson.

1872. *Murina cyclotis* DOBSON, Proc. Asiatic Soc. Bengal, Dec. (1872), 210.

Type locality.—Darjeeling, N. E. Bengal. Mindanao (Hoffman).

Genus KERIVOULA Gray.

1842. *Kerivoula* GRAY, Ann. and Mag. Nat. Hist., 10, 258, December.
Type.—*Vespertilio hardwickii* HORSFIELD.

Small, delicately-formed bats; ears extending slightly beyond nostrils when laid forward, distinctly funnel-shaped, with long slender tragi; muzzle simple. Fur long and soft.

Kerivoula hardwickii (Horsfield).

1824. *Vespertilio hardwickii* HORSFIELD, Zool. Res. in Java, (pages not numbered).
1842. *Kerivoula hardwickii* GRAY, Ann. and Mag. Nat. Hist., 10, 258.

Type locality.—Java. Mindanao (Thomas); Samar (Peters).

Kerivoula jagorii (Peters).

1867. *Vespertilio* (*Kerivoula*) *jagorii* PETERS, Monatsb. Königl. Preuss. Akad. Wiss. Berlin (1866), 399.
1878. *Kerivoula jagorii* DOBSON, Cat. Chiropt. Brit. Mus., 338.

Type locality.—Samar Island. Samar (Peters).

Kerivoula pellucida (Waterhouse).

1845. *Vespertilio pellucidus* WATERHOUSE, Proc. Zool. Soc. London (1845), 3, April.
1876. *Kerivoula pellucida* DOBSON, Monogr. Asiatic Chirop., 149.

Type locality.—Philippine Islands. Luzon (Elera); Mindanao (Elera).

Kerivoula whiteheadi Thomas.

1894. *Kerivoula whiteheadi* THOMAS, Ann. and Mag. Nat. Hist., VI, 14, 460.

Type locality.—Isabela, N. E. Luzon. Luzon (Thomas).

Family MOLOSSIDÆ.

Genus CHÆREPHON Dobson.

1874. *Chærephon* DOBSON, Journ. Asiatic Soc. Bengal, 43, pt. 2, 144.
Type.—*Nyctinomus johorensis* DOBSON.

Bats with ears connected by a low band across crown; tragus very small; tail long, free from interfemoral membrane about half its length. Upper lip thick, deeply grooved by vertical wrinkles. Wing membrane from the lower end of tibia. Fur short; color dark blackish-brown above, marbled below. Head and body about 75 millimeters.

Chærephon plicatus (Buchannan).

1800. *Vespertilio plicatus* BUCHANNAN, Trans. Linn. Soc., 5, 261.
1907. *Chærephon plicatus* ANDERSEN, Ann. Mus. Civ. di Storia Nat. di Genova, III, 3, 37, April.

Type locality.—Puttahaut, Bengal. Philippine Islands (Dobson); Luzon (Elera).

Order CARNIVORA.

Family MUSTELIDÆ.

Genus MARTES Pinel.

1792. *Martes* PINEL, Actes Soc. Hist. Nat., Paris, 1, 55, footnote.
Type.—*Martes domestica* PINEL=*Martes foina* (ERXLEBEN).

Martens, the single supposed Philippine species about the size of a domestic cat; head and body of male 458 millimeters; tail, 340. Body long and slender; tail long, but less than length of body. Color somewhat variable, but ordinarily with head brown, shoulders lighter, and rump, legs, feet, and tail black; sides of neck and throat yellowish.

Martes henricii (Westerman).

1848. *Mustela* (*Martes*) *henricii* WESTERMAN, Bijdragen tot de Dierkunde, 1, 13.

Type locality.—Java. Sulu (Trouessart).

Sanchez, Los Mamíferos de Filipinas, does not allow this species a place in his list on this authority. Possibly it should be dropped from Philippine lists.

Genus **MUSTELA** Linnæus.

1758. *Mustela* LINNÆUS, Syst. Nat., 10 ed., 1, 45. *Type.—Mustela erminea* LINNÆUS.

Weasels, the single supposed Philippine species bright tawny, with whitish head. Fur long and coarse, tail bushy. Head and body about 365 millimeters; tail about 220.

Mustela nudipes Desmarest.

1822. *Mustela nudipes* DESMAREST, Mammalogie, pt. 2, 537.

Type locality.—Java. Calamianes (Trouessart); Palawan (Trouessart); Sulu (Trouessart).

Sanchez, Los Mamíferos de Filipinas, does not allow this species a place in his list on this authority. Possibly it should be dropped from Philippine lists.

Genus **MYDAUS** F. Cuvier.

1821. *Mydaus* F. CUVIER, Hist. Nat. Mamm., 3, livr. 27, April. *Type.—Mydaus meliceps* F. CUVIER.

"Javan skunk." Black, with more or less white on head, nape, and back. Tail very short. Muzzle pointed, nose pig-like. Front claws very long and little curved. Anal glands emitting an odor like that of the American skunks. Head and body about 460 millimeters.

Mydaus marchei Huet.

1887. *Mydaus marchei* HUET, Le Naturaliste, II, 9 ann., No. 13, 149, September 15.

Type locality.—Palawan. Balábac (Sanchez); Palawan (Huet).

Mydaus schadenbergii Jentink.

1895. *Mydaus schadenbergii* JENTINK, Notes from Leyden Mus., 17, No. IX, 46, August.

Type locality.—Calamianes Islands. Calamianes (Jentink).

Genus **AONYX** Lesson.

1827. *Aonyx* LESSON, Man. Mammalogie, 157. *Type.—Aonyx delalandi* LESSON=*Lutra capensis* SCHINZ.

"Clawless" otters. Color brown; feet webbed, claws rudimentary. Head and body about 470 millimeters, tail about 290.

Aonyx cinerea (Illiger).

1815. *Lutra cinerea* ILLIGER, Abh. Ak. Berlin (1811), 99.

1909. *Aonyx cinerea* LYON, Proc. U. S. Nat. Mus., 36, 485, June 1.

Type locality.—Near Batavia, Java. Palawan (Allen).

Family VIVERRIDÆ.

Genus VIVERRA Linnæus.

1758. *Viverra* LINNÆUS, Syst. Nat., 10 ed., 1, 43. *Type.—Viverra zibetha* LINNÆUS.

Civets; the form found in the Philippine Islands with ground color of gray, spotted and striped with black. Tail about half the length of head and body, black and whitish. Head and body about 600 millimeters; tail about 300.

Viverra tangalunga Gray.
1832. *Viverra tangalunga* GRAY, Proc. Zool Soc. London, 63.

Type locality.—Indian Archipelago. Calamianes (Bourns & Worcester); Luzon (Thomas); Mindanao (Bourns & Worcester); Mindoro (Bourns & Worcester); Palawan (Thomas); Panay (Bourns & Worcester); Siquijor (Bourns & Worcester).

Genus PARADOXURUS F. Cuvier.

1821. *Paradoxurus* F. CUVIER, Hist. Nat. Mamm., 3, livr. 24, pl. with text (under 'la marte des palmiers'), January. *Type.—Paradoxurus typus* F. CUVIER=*Viverra niger* DESMAREST.

Palm civets. Less strikingly marked than *Viverra*, with longer tail. General color blackish brown, with five or six indistinct stripes of black along back. Top of head, feet, and tail blackish. Head and body about 440 millimeters; tail about 360.

Paradoxurus minax Thomas.
1909. *Paradoxurus minax* THOMAS, Ann. and Mag. Nat. Hist., VIII, 3, 375, April.

Type locality.—Davao, South Mindanao. Camiguin (Thomas); Mindanao (Thomas).

Paradoxurus philippinensis Jourdan.
1837. *Paradoxurus philippinensis* JOURDAN, Compt. rend. Acad. Sci. Paris, 5, 523.

Type locality.—Luzon. Basilan (Bourns & Worcester); Leyte (Elera); Luzon (Thomas); Marinduque (Steere); Mindoro (Bourns & Worcester); Negros (Steere); Palawan (Thomas); Panay (Bourns & Worcester); Siquijor (Sanchez).

Paradoxurus torvus Thomas.
1909. *Paradoxurus torvus* THOMAS, Ann. and Mag. Nat. Hist., VIII, 3, 375, April.

Type locality.—Bongao, Tawi Tawi Group. Bongao (Thomas).

Genus **ARCTICTIS** Temminck.

1824. *Arctictis* TEMMINCK, Prosp. de Monog. des Mamm. [Palmer, Index Gen. Mamm. (1904), 117.] *Type.—Viverra* (?) *binturong* RAFFLES.

The binturong. Size large, with tail about as long as head and body. Ears with long tufts of hair. General color black, more or less washed with fulvous. Head and body of Palawan form, 700 millimeters; tail, 710.

Arctictis whitei Allen.

1910. *Arctitis* (sic.) *whitei* ALLEN, Bull. Am. Mus. Nat. Hist., **28**, **15**, January 29.

Type locality.—Iwahig, Palawan. Palawan (Allen).

Genus **MUNGOS** Geoffroy and Cuvier.

1795. *Mungos* GEOFFROY AND CUVIER, Mag. Encycl., 2, 184. *Type.—Viverra mungos* GMELIN.

Mongooses. The Philippine species, above yellowish-red, marked with black; head paler and grayer than body; under parts reddish-brown. Head and body, 395 millimeters; tail, 190.

Mungos palawanus Allen.

1910. *Mungos palawanus* ALLEN, Bull. Am. Mus. Nat. Hist., **28**, **17**, January 29.

Type locality.—Iwahig, Palawan. Palawan (Allen).

Mungos parvus (Jentink).

1895. *Herpestes parvus* JENTINK, Notes from Leyden Mus., **17**, No. 9, 48, August.

Type locality.—Calamianes Islands. Calamianes (Jentink).

Family FELIDÆ.

Genus **FELIS** Linnæus.

1758. *Felis* LINNÆUS, Syst. Nat., 10 ed., **1**, 41. *Type.—Felis catus* LINNÆUS.

Cats. Hind feet with only four toes; claws completely retractile. Two species wild in Philippines, one native species and the feral domestic cat. The single known native species is about the size of a well-grown domestic cat, but with relatively longer legs. Markings variable; yellowish-gray to yellow, with dark brown markings. Tail long and spotted.

Felis catus Linnæus.

1758. *Felis catus* LINNÆUS, Syst. Nat., 10 ed., 1, 42.[1]

Type locality.—Sweden. Luzon, feral (Thomas).

Felis minuta Temminck.

1827. *Felis minuta* TEMMINCK, Monogr. des Mamm., 1, 130.

Type locality.—Java. Calamianes (Sanchez); Cebu (Thomas); Negros (Thomas); Palawan (Allen); Panay (Thomas).

Order RODENTIA.

Family SCIURIDÆ.

Genus **NANNOSCIURUS** Trouessart.

1880. *Nannosciurus* TROUESSART, Le Naturaliste, 2, No. 37, 292, October 1. *Type.*—*Sciurus melanotis* MÜLLER AND SCHLEGEL.

Very small squirrels; not much larger than mice. Head and body about 115 millimeters, tail vertebræ about 72. General color brownish.

Nannosciurus concinnus (Thomas).

1888. *Sciurus concinnus* THOMAS, Ann. and Mag. Nat. Hist., VI, 2, 407.

1893. *Nannosciurus concinnus* MAJOR, Proc. Zool. Soc. London, (1893), 189.

Type locality.—Isabela, Basilan. Basilan (Thomas); Mindanao (Bourns & Worcester).

Nannosciurus samaricus Thomas.

1897. *Nannosciurus samaricus* THOMAS, Minutes Proc. Zool. Soc. London, for June 15, 1897, June 19.

Type locality.—Samar. Samar (Thomas).

Genus **SCIURUS** Linnæus.

1758. *Sciurus* LINNÆUS, Syst. Nat., 10 ed., 1, 63. *Type.*—*Sciurus vulgaris* LINNÆUS.

Squirrels. Philippine species all relatively small. Coloration variable, some plain brownish-gray, not conspicuously marked, others with brilliant tails and bellies.

Sciurus albicauda Matschie.

1898. *Sciurus albicauda* MATSCHIE, Sitz.-ber. Ges. Nat. Freunde Berlin (1898), No. 5, 42, May.

Type locality.—Culion. Culion (Matschie).

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[1] For use of the name *Felis catus* for the domestic cat see Pocock, *Proc. Zool. Soc. London* (1907), 149.

Sciurus juvencus Thomas.

1908. *Sciurus juvencus* THOMAS, Ann. and Mag. Nat. Hist., VIII, 2, 498, December.

Type locality.—Palawan. Palawan (Thomas).

Sciurus mindanensis Steere.

1890. *Sciurus mindanensis* STEERE, List Birds and Mamm. Steere. Exp. Philippines, 29, July 14.

1890. *Sciurus cagsi* MEYER, Proc. Zool. Soc. London, 600. (Davao, South Mindanao.)

Type locality.—Mindanao. Basilan (Bourns & Worcester); Mindanao (Steere).

Sciurus möllendorffi Matschie.

1898. *Sciurus möllendorffi* MATSCHIE, Sitz.-Ber. Ges. Nat. Freunde Berlin (1898), No. 5, 41, May.

Type locality.—Culion. Culion (Matschie).

Sciurus philippinensis Waterhouse.

1839. *Sciurus philippinensis* WATERHOUSE, Proc. Zool. Soc. London, 7, 117.

Type locality.—Mindanao. Balabac (Elera); Basilan (Thomas); Mindanao (Waterhouse).

Sciurus samarensis Steere.

1890. *Sciurus samarensis* STEERE, List Birds and Mamm. Steere Exp. Philippines, 30, July 14.

Type locality.—Samar. Leyte (Steere); Samar (Steere).

Sciurus steerii Günther.

1876. *Sciurus steerii* GÜNTHER, Proc. Zool. Soc. London (1876), 735.

Type locality.—Balabac (Günther).

Family PETAURISTIDÆ.

Genus SCIUROPTERUS F. Cuvier.

1825. *Sciuropterus* F. CUVIER, Dents Mammifères, 255. *Type.*—*Sciurus volans* LINNÆUS=*Sciuropterus russicus* (TIEDEMANN).

Flying-squirrels; fore and hind limbs connected by a membrane, forming a parachute. Philippine forms large; fur long and soft; general color brownish above, paler below. Head and body over 300 millimeters; tail over 260.

Sciuropterus crinitus Hollister.

1911. *Sciuropterus crinitus* HOLLISTER, Proc. Biol. Soc. Wash. (1911), 24, 185, June 23.

Type locality.—Basilan Island. Basilan (Hollister).

Sciuropterus nigripes Thomas.

1893. *Sciuropterus nigripes* THOMAS, Ann. and Mag. Nat. Hist., VI, 12, 30, July.

Type locality.—Puerta Princesa, Palawan. Palawan (Thomas).

Family MURIDÆ.

Genus CELÆNOMYS Thomas.

1898. *Celænomys* THOMAS, Trans. Zool. Soc. London, 14, pt. VI, 390, June. *Type.*—*Xeromys (?) silaceus* THOMAS.

Size of a common rat. Fur soft and velvety. General color uniform slate-gray. Ears short. Upper and lower cheek teeth two only on each side. Head and body, 195 millimeters; tail, 110; hind foot, 33.

Celænomys silaceus (Thomas).

1895. *Xeromys (?) silaceus* THOMAS, Ann. and Mag. Nat. Hist., VI, 16, 161.

1898. *Celænomys silaceus* THOMAS, Trans. Zool. Soc. London, 14, pt. VI, 390, June.

Type locality.—Highlands of northern Luzon. Luzon (Thomas).

Genus CRUNOMYS Thomas.

1898. *Crunomys* THOMAS, Trans. Zool. Soc. London, 14, pt. VI, 393, June. *Type.*—*Crunomys fallax* THOMAS.

Fur short and close, mixed with flattened spines. General color pale grayish, lined with yellowish on the back; dorsal spines white, black at tips. Ears short. Molars 3/3. Head and body, 105 millimeters; tail, 79; hind foot, 23.

Crunomys fallax Thomas.

1897. *Crunomys fallax* THOMAS, Minutes Proc. Zool. Soc. London for June 15, 1897, June 19, 1897.[3]

Type locality.—Isabella, Luzon. Luzon (Thomas).

Crunomys melanius Thomas.

1907. *Crunomys melanius* THOMAS, Abstract Proc. Zool. Soc. London, No. 39, 5. February 12.

Type locality.—Mount Apo, Mindanao; 914 meters. Mindanao (Thomas).

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[3] Reference not verified; from Thomas, *Trans. Zool. Soc. London* (1898), 14, 394, June. Possibly not first described in genus *Crunomys*, which apparently was first diagnosed in June, 1898.

Genus CHROTOMYS Thomas.

1895. *Chrotomys* THOMAS, Ann. and Mag. Nat. Hist., VI, 16, 161. *Type.—Chrotomys whiteheadi* THOMAS.

About the size of the common rat, with much shorter tail. Back prominently marked with one buff and two blackish stripes, extending from between eyes to rump. Head and body, 196 millimeters; tail, 111; hind foot, 35.

Chrotomys whiteheadi Thomas.

1895. *Chrotomys whiteheadi* THOMAS, Ann. and Mag. Nat. Hist., VI, 16, 161.

Type locality.—Highlands of northern Luzon. Luzon (Thomas).

Genus RHYNCHOMYS Thomas.

1895. *Rhynchomys* THOMAS, Ann. and Mag. Nat. Hist., VI, 16, 160. *Type.—Rhynchomys soricoides* THOMAS.

Size of common rat; fur thick, close, and velvety; muzzle greatly elongated; tail shorter than head and body, rat-like, scaly and thinly-haired; general color dark olivaceous-gray, extreme tip of tail usually white. Teeth very small; molars 2/2.

Rhynchomys soricoides Thomas.

1895. *Rhynchomys soricoides* THOMAS, Ann. and Mag. Nat. Hist., VI, 16, 160.

Type locality.—Highlands of northern Luzon. Luzon (Thomas).

Genus PHLŒOMYS Waterhouse.

1839. *Phlœomys* WATERHOUSE, Proc. Zool. Soc. London, 7, 108. *Type.—Mus cumingi* WATERHOUSE.

Size large (head and body about 440 millimeters; tail about 350). Muzzle blunt; ears hairy externally; tail thickly haired. Incisor teeth very broad. Colors black, or black and white.

Phlœomys cumingi (Waterhouse).

1839. *Mus* (*Phlœomys*) *cumingi* WATERHOUSE, Proc. Zool. Soc. London, 7, 108.

1843. *Phlæomys cumingi* GRAY, List. Mamm. British Mus., 115.

1895. ? *Phlæomys albayensis* ELERA, Cat. Sist. Fauna Filip., 1, 21. (*Nomen nudum.*)

Type locality.—Luzon. Luzon (Waterhouse); Marinduque (Steere); Mindoro (Trouessart).

Phlœomys pallidus Nehring.

1890. *Phlœomys pallidus* NEHRING, Sitz.-ber. Ges. Nat. Freunde Berlin, No. 6, 106, June 17.

Type locality.—Luzon. Luzon (Thomas); Marinduque (Thomas).

Genus **EPIMYS** Trouessart.

1881. *Epimys* TROUESSART, Bull. Soc. d'Etudes Sci. d'Angers, 10, 117.
Type.—*Mus rattus* LINNÆUS.

True rats. Size and appearance variable, from small soft-haired mouse-like species to large coarse-furred rats, larger than the Norway rat. Several species have spines, mixed with the fur of the back, in certain pelages. Tail usually little furred, scaly and relatively long. Molars 3/3, slightly graduated in size from first to third.

Epimys albigularis (Mearns).
1905. *Mus albigularis* MEARNS, Proc. U. S. Nat. Mus., 28, 440.

Type locality.—Mount Apo, Mindanao; 2,316 meters. Mindanao (Mearns).

Epimys calcis Hollister.
1911. *Epimys calcis* HOLLISTER, Proc. Biol. Soc. Wash., 24, 89, May 15, 1911.

Type locality.—Limestone Hills, near Lime Kiln, Baguio, Benguet, Luzon. Luzon (Hollister).

Epimys datae (Meyer).
1899. *Mus datae* MEYER, Abhandl. und Berichte des Königl. Zool. Mus. Dresden, (1898–99), 7, No. 7, p. 25.

Type locality.—Mount Data, northern Luzon. Luzon (Meyer).

Epimys ephippium (Jentink).
1880. *Mus ephippium* JENTINK, Notes from Leyden Mus., 2, 15.
1911. *Epimys ephippium* LYON, Proc. U. S. Nat. Mus., 40, 98, April 25.

Type locality.—Sumatra. Palawan (Trouessart).

Epimys everetti (Günther).
1879. *Mus everetti* GÜNTHER, Proc. Zool. Soc. London, 75.
1910. *Epimys everetti* MILLER, Proc. U. S. Nat. Mus., 38, 398, August 19.

Type locality.—Philippine Islands. Luzon (Trouessart); Mindanao (Elera).

Epimys gala Miller.
1910. *Epimys gala* MILLER, Proc. U. S. Nat. Mus., 38, 398, August 19.

Type locality.—Alag River, Mindoro. Mindoro (Miller).

Epimys kelleri (Mearns).
1905. *Mus kelleri* MEARNS, Proc. U. S. Nat. Mus., 28, 444.

Type locality.—Davao, Mindanao. Mindanao (Mearns).

Epimys luteiventris (Allen).

1910. *Mus luteiventris* ALLEN, Bull. Am. Mus. Nat. Hist., 28, 14, January 29.

Type locality.—Iwahig, Palawan. Palawan (Allen).

Epimys luzonicus (Thomas).

1895. *Mus luzonicus* THOMAS, Ann. and Mag. Nat. Hist., VI, 16, 163.

Type locality.—Highlands of northern Luzon. Luzon (Thomas).

Epimys magnirostris (Mearns).

1905. *Mus magnirostris* MEARNS, Proc. U. S. Nat. Mus., 28, 441.

Type locality.—Zamboanga, Mindanao. Mindanao (Mearns).

Epimys mindanensis (Mearns).

1905. *Mus mindanensis* MEARNS, Proc. U. S. Nat. Mus., 28, 442.

Type locality.—Todaya, Mount Apo, Mindanao; 1,219 meters. Mindanao (Mearns).

Epimys mindorensis (Thomas).

1897. *Mus mindorensis* THOMAS, Minutes Proc. Zool. Soc. London for June 15, 1897, June 19.

Type locality.—Mount Dulangan, Mindoro. Mindoro (Thomas).

Epimys neglectus (Jentink).

1880. *Mus neglectus* JENTINK, Notes from Leyden Mus., 2, 14, January.

1911. *Epimys neglectus* LYON, Proc. U. S. Nat. Mus., 40, 98, April 25.

Type locality.—Borneo. Mindoro (Thomas).

Epimys negrinus (Thomas).

1898. *Mus ephippium negrinus* THOMAS, Trans. Zool. Soc. London, 14, pt. 6, p. 403, June.

1911. *Epimys negrinus* HOLLISTER, Proc. Biol. Soc. Wash., 24, 90, May 15.

Type locality.—Negros Island; 2,011 meters. Negros (Thomas).

Epimys norvegicus (Erxleben).

1777. *Mus norvegicus* ERXLEBEN, Syst. Regn. Anim., Class I, Mamm., 381.

1908. *Epimys norwegicus* SATUNIN, Mitt. Kaukas. Mus., Tiflis, 4, 59.

Type locality.—Norway. Luzon (Thomas); Samar (Sanchez); Masbate (Sanchez); Mindoro (Sanchez).

Epimys pantarensis (Mearns).

1905. *Mus pantarensis* MEARNS, Proc. U. S. Nat. Mus., 28, 448.

Type locality.—Pantar, Mindanao; 581 meters. Mindanao (Mearns).

Epimys querceti Hollister.

1911. *Epimys querceti* HOLLISTER, Proc. Biol. Soc. Wash., 24, 90, May 15, 1911.

Type locality.—Haights-in-the-Oaks, Benguet, Luzon. Luzon (Hollister).

Epimys rattus (Linnæus).

1758. *Mus rattus* LINNÆUS, Syst. Nat., 10 ed., 1, 61.
1908. *Epimys rattus* SATUNIN, Mitt. Kaukas. Mus., Tiflis, 4, 60.

Type locality.—Upsala, Sweden. Luzon (Sanchez); Masbate (Sanchez); Mindoro (Thomas); Negros (Thomas); Samar (Sanchez).

Epimys tagulayensis (Mearns).

1905. *Mus tagulayensis* MEARNS, Proc. U. S. Nat. Mus., 28, 439.

Type locality.—Tagulaya, Gulf of Davao, Mindanao. Mindanao (Mearns).

Epimys todayensis (Mearns).

1905. *Mus todayensis* MEARNS, Proc. U. S. Nat. Mus., 28, 445.

Type locality.—Todaya, Mount Apo, Mindanao; 1,219 meters. Mindanao (Mearns).

Epimys tyrannus Miller.

1910. *Epimys tyrannus* MILLER, Proc. U. S. Nat. Mus., 38, 397, August 19.

Type locality.—Ticao Island. Ticao (Miller).

Epimys vulcani vulcani (Mearns).

1905. *Mus vulcani* MEARNS, Proc. U. S. Nat. Mus., 28, 446.
1911. *Epimys vulcani* HOLLISTER, Proc. Biol. Soc. Wash., 24, 89, May 15.

Type locality.—Mount Apo, Mindanao; 2,316 meters. Mindanao (Mearns).

Epimys vulcani apicis (Mearns).

1905. *Mus vulcani apicis* MEARNS, Proc. U. S. Nat. Mus., 28, 447.

Type locality.—Summit of Mount Apo, Mindanao; 2,956 meters. Mindanao (Mearns).

Epimys zamboangæ (Mearns).

1905. *Mus zamboangæ* MEARNS, Proc. U. S. Nat. Mus., 28, 443.

Type locality.—Zamboanga, Mindanao. Mindanao (Mearns).

Genus BULLIMUS Mearns.

1905. *Bullimus* MEARNS, Proc. U. S. Nat. Mus., 28, 450. *Type.*—*Bullimus bagobus* MEARNS.

Similar to *Epimys;* size medium; muzzle long; pelage coarse, containing a mixture of ordinary coarse hair and slender spines on upper surface. Color brown above, yellowish-white below. Molars with crowns much higher than in *Epimys;* mammæ, 1–3=8.

Regarded by Thomas, *Proc. Zool. Soc. London* (1907), 141, as a synonym of *Epimys*. The peculiar mammary formula and the hypsodont molars seem sufficient characters to warrant its retention as a full genus.

Bullimus bagobus Mearns.

1905. *Bullimus bagobus* MEARNS, Proc. U. S. Nat. Mus., 28, 450.

Type locality.—Todaya, Mount Apo, Mindanao. Mindanao (Mearns).

Genus LIMNOMYS Mearns.

1905. *Limnomys* MEARNS, Proc. U. S. Nat. Mus., 28, 451. *Type.*—*Limnomys sibuanus* MEARNS.

A small rat with long heavy fur; tail longer than head and body, thinly haired, annulations plainly visible except near end. General color above reddish-brown, below cream buff; upper surfaces of feet seal brown. Head and body, 125 millimeters; tail, 150; hind foot, 30.

Limnomys sibuanus Mearns.

1905. *Limnomys sibuanus* MEARNS, Proc. U. S. Nat. Mus., 28, 452.

Type locality.—Mount Apo, Mindanao; 2,011 meters. Mindanao (Mearns).

Genus TRYPHOMYS Miller.

1910. *Tryphomys* MILLER, Proc. U. S. Nat. Mus., 38, 399, August 19. *Type.*—*Tryphomys adustus* MILLER.

Size of a small common rat; fur of back coarse and harsh. Outer digits of hind foot short, neither extending beyond bases of three middle digits. Above mixed brown and black, under parts buffy white. Head and body, 174 millimeters; tail, 150; hind foot, 33.

Tryphomys adustus Miller.

1910. *Tryphomys adustus* MILLER, Proc. U. S. Nat. Mus., 38, 399, August 19.

Type locality.—Haights-in-the-Oaks, Benguet, Luzon. Luzon (Miller).

Genus MUS Linnæus.

1758. *Mus* LINNÆUS, Syst. Nat., 10 ed., 1, 59. *Type.*—*Mus musculus* LINNÆUS.

Small mice like the common house mouse. Anterior upper molar longer than the two posterior upper molars combined.

Mus castaneus Waterhouse.

1843. *Mus castaneus* WATERHOUSE, Ann. and Mag. Nat. Hist., 12, 134.

Type locality.—Philippine Islands. Cebu (Elera); Luzon (Elera).

Mus commissarius Mearns.

1905. *Mus commissarius* MEARNS, Proc. U. S. Nat. Mus., 28, 449.

Type locality.—Davao, Mindanao. Luzon (Miller); Mindanao (Mearns).

Elera's record of *Mus musculus* doubtless belongs here. It seems strange that *Mus musculus* should not occur in the Philippine Islands; but all the specimens of true *Mus* from the Islands, in the collection of the United States National Museum, prove to be *Mus commissarius* Mearns. Possibly *M. commissarius*=*M. castaneus* Waterhouse.

Genus **TARSOMYS** Mearns.

1905. *Tarsomys* MEARNS, Proc. Biol. Soc. Wash., 28, 453. *Type.*—*Tarsomys apoensis* MEARNS.

Resembling *Epimys*. Pelage long and rather coarse, sometimes slightly spiny. Tail concolor, quite thickly haired; toes tufted at base of claws. General color rich brownish-slate, more yellowish-brown below. Head and body, 135 millimeters; tail, 120; hind foot, 32.

Tarsomys apoensis Mearns.

1905. *Tarsomys apoensis* MEARNS, Proc. U. S. Nat. Mus., 28, 453.

Type locality.—Mount Apo, Mindanao; 2,057 meters. Mindanao (Mearns).

Genus **BATOMYS** Thomas.

1895. *Batomys* THOMAS, Ann. and Mag. Nat. Hist., VI, 16, 162. *Type.*—*Batomys grantii* THOMAS.

Large, very heavily furred rats. Ears broad and rounded; tail slightly shorter than head and body. Upper parts dark, rich fulvous brown, below paler. Head and body about 200 millimeters; tail about 185; hind foot, 36.

Batomys dentatus Miller.

1910. *Batomys dentatus* MILLER, Proc. U. S. Nat. Mus., 38, 400, August 19.

Type locality.—Haights-in-the-Oaks, Benguet, Luzon, 2,134 meters. Luzon (Miller).

Batomys grantii Thomas.

1895. *Batomys grantii* THOMAS, Ann. and Mag. Nat. Hist., VI, 16, 162.

Type locality.—Highlands of northern Luzon. Luzon (Thomas).

Genus CARPOMYS Thomas.

1895. *Carpomys* THOMAS, Ann. and Mag. Nat. Hist., VI, 16, 161. *Type.—Carpomys melanurus* THOMAS.

Externally somewhat similar to *Batomys;* fur thick and wooly; tail long, well haired, darker in color than body. General color deep fulvous, coarsely lined with black; under parts dull yellowish-white. Head and body about 197 millimeters; tail, 175 to 211; hind foot, 31 to 34.

Carpomys melanurus Thomas.

1895. *Carpomys melanurus* THOMAS, Ann. and Mag. Nat. Hist., VI, 16, 162.

Type locality.—Highlands of northern Luzon. Luzon (Thomas).

Carpomys phæurus Thomas.

1895. *Carpomys phæurus* THOMAS, Ann. and Mag. Nat. Hist., VI, 16, 162.

Type locality.—Highlands of northern Luzon. Luzon (Thomas).

Genus CRATEROMYS Thomas.

1895. *Crateromys* THOMAS, Ann. and Mag. Nat. Hist., VI, 16, 163. *Type.—Phlœomys schadenbergi* MEYER.

Size very large; externally somewhat like *Phlœomys,* but with more bushy tail and much smaller claws. Muzzle pointed. Normal color black; some specimens are gray or black and gray. Head and body about 440 millimeters; tail about 425.

Crateromys schadenbergi (Meyer).

1895. *Phlœomys schadenbergi* MEYER, Abhandl. und Berichte des Königl. Zool. Mus. Dresden (1894–95), No. 6, 1.

1896. *Crateromys schadenbergi* MEYER, Abhandl. und Berichte Königl. Zool. Mus. Dresden (1896–97), No. 6, 32.

Type locality.—Mount Data, Luzon. Luzon (Meyer).

Genus APOMYS Mearns.

1905. *Apomys* MEARNS, Proc. U. S. Nat. Mus., 28, 455. *Type.—Apomys hylocœtes* MEARNS.

Smallish brown rats, much like the smaller species of *Epimys.* Tail nearly bare of hairs; anterior upper molar about equal in length to posterior two, and posterior upper molar very small, as in *Mus.*

Apomys bardus Miller.

1910. *Apomys bardus* MILLER, Proc. U. S. Nat. Mus., 38, 402, August 19.

Type locality.—Mount Bliss, Mindanao; 1,753 meters. Mindanao (Miller).

Apomys hylocœtes Mearns.

1905. *Apomys hylocœtes* MEARNS, Proc. U. S. Nat. Mus., 28, 456.

Type locality.—Mount Apo, Mindanao; 1,829 meters. Mindanao (Mearns).

Apomys insignis Mearns.

1905. *Apomys insignis* MEARNS, Proc. U. S. Nat. Mus., 28, 459.

Type locality.—Mount Apo, Mindanao; 1,829 meters. Mindanao (Mearns).

Apomys major Miller.

1910. *Apomys major* MILLER, Proc. U. S. Nat. Mus., 38, 402, August 19.

Type locality.—Haights-in-the-Oaks, Benguet, Luzon; 2,134 meters. Luzon (Miller).

Apomys musculus Miller.

1910. *Apomys musculus* MILLER, Proc. U. S. Nat. Mus., 38, 403, August 19.

Type locality.—Camp John Hay, Baguio, Benguet, Luzon; 1,524 meters. Luzon (Miller).

Apomys petræus Mearns.

1905. *Apomys petræus* MEARNS, Proc. U. S. Nat. Mus., 28, 458.

Type locality.—Mount Apo, Mindanao; 2,316 meters. Mindanao (Mearns).

Family HYSTRICIDÆ.

Genus THECURUS Lyon.

1907. *Thecurus* LYON, Proc. U. S. Nat. Mus., 32, 582, June 29.
Type.—*Thecurus sumatræ* LYON.

Small porcupines, with short tail (less than one-fourth the length of head and body). Body covered with flattened spines, lower back with long, round quills.

Thecurus pumilus (Günther).

1879. *Hystrix pumila* GÜNTHER, Ann. and Mag. Nat. Hist., V, 4, 106.

Type locality.—Puerto Princesa, Palawan. Balabac (Sanchez); Calamianes (Bourns & Worcester); Palawan (Günther).

Order PHOLIDOTA.

Family MANIDÆ.

Genus MANIS Linnæus.

1758. *Manis* LINNÆUS, Syst. Nat., 10 ed., 1, 36. *Type.—Manis pentadactyla* LINNÆUS.

Pangolins or scaly anteaters. Upper parts of body, and tail above and below, covered with horny scales. Three middle claws long and curved. No teeth.

Manis javanica Desmarest.

1822. *Manis javanica* DESMAREST, Mammalogie 2, 377.

Type locality.—Java. Culion (Elera); Palawan (Bourns & Worcester).

Order PRIMATES.

Family LEMURIDÆ.

Genus NYCTICEBUS Geoffroy.

1812. *Nycticebus* GEOFFROY, Ann. Mus. Hist. Nat., Paris, 19, 163. *Type.—Nycticebus bengalensis* GEOFFROY=*Tardigradus coucang* BODDAERT.

Slow lemurs. Small nocturnal lorises with no external tail. A white streak between eyes and a dark stripe from head down back. Head and body about 285 millimeters; hind foot, 66.

Nycticebus menagensis (Lydekker).

1893. *Lemur menagensis* LYDEKKER, Zool. Rec. (1892), 29, 25.
1908. *Nycticebus philippinus* CABRERA, Bol. Real. Soc. Esp. Hist. Nat. 8, No. 3, p. 137, March. (Mindanao ?)
1908. *Nycticebus menagensis* THOMAS, Ann. and Mag. Nat. Hist., VIII, 1, 469, June.

Type locality.—Bongao and Tawi Tawi. Bongao (Bourns & Worcester); Bohol (Elera); Mindanao ? (Cabrera); Tawi Tawi (Bourns & Worcester).

Should the slow lemur prove to inhabit Mindanao, and the specimens agree with Cabrera's type of *N. philippinus*, and differ from the form found in Bongao and Tawi Tawi, both names will stand, though *philippinus* was proposed chiefly to replace *menagensis*, which Cabrera supposed to be without standing in nomenclature.

Family TARSIIDÆ.

Genus TARSIUS Storr.

1780. *Tarsius* STORR, Prodr. Meth. Mamm., 33, tab. A. *Type.*—*Lemur tarsius* 'ERXLEBEN' (=*Lemur tarsier* ERXLEBEN).

Tarsiers. Small monkey-like animals with large eyes and ears, long fingers and toes, and long tail. Tail naked except at extreme base and tip. Head and body about 120 millimeters; tail about 210; hind foot about 60.

Tarsius carbonarius Heude.

1899. *Tarsius carbonarius* HEUDE, Mém. Hist. Nat. Emp. Chinois, 4, pt. 4, 164, pl. 33, figs. 1, 2, and 3.

Type locality.—Gulf of Davao, Mindanao. Mindanao (Heude).

Tarsius fraterculus Miller.

1910. *Tarsius fraterculus* MILLER, Proc. U. S. Nat. Mus., 38, 404, August 19.

Type locality.—Sevilla, Bohol. Bohol (Miller).

Tarsius philippensis Meyer.

1895. *Tarsius philippensis* MEYER, Abhand. und Berichte des Königl. Zool. Mus. Dresden (1894–95), No. 1, 1.

Type locality.—Mindanao, Leyte, and Samar. Leyte (Meyer); Luzon (Trouessart); Mindanao (Meyer); Samar (Meyer).

Family CERCOPITHECIDÆ.

Genus PITHECUS Geoffroy and Cuvier.

1795. *Pithecus* GEOFFROY AND CUVIER, Mag. Encycl., 3, 462. *Type.*—[4]

Medium sized monkeys commonly known as macaques. Philippine species with long tails, about as long as head and body.

Pithecus cagayanus (Mearns).

1905. *Cynomolgus cagayanus* MEARNS, Proc. U. S. Nat. Mus., 28, 431.

Type locality.—Cagayan Sulu Island, Sulu Sea. Cagayan Sulu (Mearns).

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[4] Thomas, *Proc. Zool. Soc. London* (1911), 125, shows that *Simia* Linnæus is the proper generic name of the Barbary macaque. If this monkey, *Simia inuus* Linnæus, be congeneric with the Malayan group of long-tailed macaques, lately called *Pithecus*, as seems very doubtful, the name *Simia* will stand for all the Philippine species. Without seeing the original publication of *Pithecus*, I do not feel justified in selecting a type for the genus, which apparently has not yet been done.

Pithecus mindanensis mindanensis (Mearns).

1905. *Cynomolgus mindanensis* MEARNS, Proc. U. S. Nat. Mus., 28, 428.

Type locality.—Pantar, Mindanao; 579 meters. Basilan (Mearns); Mindanao (Mearns).

Pithecus mindanensis apoensis (Mearns).

1905. *Cynomolgus mindanensis apoensis* MEARNS, Proc. U. S. Nat. Mus., 28, 429.

Type locality.—Mount Apo, Mindanao; 1,829 meters. Mindanao (Mearns).

Pithecus suluensis (Mearns).

1905. *Cynomolgus suluensis* MEARNS, Proc. U. S. Nat. Mus., 28, 430.

Type locality.—Crater Lake Mountain, Sulu. Sulu (Mearns).

Pithecus syrichta (Linnæus).

1758. *Simia syrichta* LINNÆUS, Syst. Nat., 10 ed., 1, 29.
1843. *Macacus philippinensis* I. GEOFFROY, Archive du Mus. d'Hist. Nat., 2, 568, pl. XXXIII, 1841 (1843). (Manila, Luzon.)
1851. *Macacus palpebrosus* I. GEOFFROY, Cat. des Primates, 93. (Manila, Luzon.)
1867. *Macacus fur* SLACK, Proc. Acad. Nat. Sci. Phila., 19, 36, pl. 1. (Luzon.)
1870. *Macacus cynomolgus* var. *cumingii* GRAY, Cat. Monk., Lemurs, and Fruit-eating Bats, 30. (Philippine Islands.)

Type locality.—Luzon. Leyte (Steere); Luzon (Mearns); Mindoro (Thomas); Negros (Steere); Palawan (Steere); Samar (Steere).

Genus **CYNOPITHECUS** I. Geoffroy.

1835. *Cynopithecus* I. GEOFFROY, in Gervais' Résumé Leçons de Mammalogie au Muséum, 16. [Fide Palmer, Index Gen. Mamm., (1904), 212.] *Type.*—*Cynopithecus niger* (DESMAREST).

The black ape of Celebes. Size larger than *Pithecus*, tail very short; color black.

Cynopithecus niger (Desmarest).

1822. *Cynocephalus niger* DESMAREST, Mammalogie, pt. 2, Suppl., 534.
1840. *Cynopithecus niger* LESSON, Spéc. des Mamm. Bimanes et Quadrumanes, 101.

Type locality.—"Indian Archipelago," probably Celebes. Negros (Elera); Sulu (Elera).

Probably introduced. Regarded by Sanchez as occurring only as a captive or escaped animal, and not admitted in his list.

Family HYLOBATIDÆ.

Genus HYLOBATES Illiger.

1811. *Hylobates* ILLIGER, Prodr. Syst. Mamm. et Avium, 67. *Type.*—*Simia lar*=*Homo lar* LINNÆUS.

Gibbons. Size large, body and limbs slender, arms especially long, the hands reaching ground when animal walks upright. No tail.

Hylobates funereus I. Geoffroy.

1850. *Hylobates funereus* I. GEOFFROY, Compt. rend. Acad. Sci., 31, 874.

Type locality.—Sulu. Sulu (Geoffroy).

Regarded by Sanchez as an introduced species, found only in captivity, and not admitted in his list, Los Mamíferos de Filipinas, 178.

Order ARTIODACTYLA.

Family SUIDÆ.

Genus SUS Linnæus.

1758. *Sus* LINNÆUS, Syst. Nat., 10 ed., 1, 49. *Type.*—*Sus scrofa* LINNÆUS.

Pigs. Size large; snout elongated. Hoofs of middle toes with inner surfaces flattened. Upper incisor teeth present.

Sus ahoenobarbus Huet.

1888. *Sus ahoenobarbus* HUET, Le Naturaliste, II, No. 20, 5, January.

Type locality.—Palawan. Calamianes (Bourns & Worcester); Palawan (Huet).

Sus barbatus balabacensis Major.

1897. *Sus barbatus balabacensis* MAJOR, Ann. and Mag. Nat. Hist., VI, 19, 534.

Type locality.—Balabac Island. Balabac (Major).

Sus barbatus palavensis Nehring.

1889. *Sus barbatus* var. *palavensis* NEHRING, Abhandl. und Berichte des Königl. Zool. Mus. Dresden (1888-89) 22.

Type locality.—Puerto Princesa, Palawan. Palawan (Nehring).

Sus calamianensis Heude.

1892. *Sus calamianensis* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, 114, pl. XX B, fig. 3.

Type locality.—Calamianes Islands (Heude, l. c., p. 221). Culion (Nehring).

Sus cebifrons (Heude).

1892. *Neosus cebifrons* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, 106.

1897. *Sus cebifrons* MAJOR, Ann. and Mag. Nat. Hist., VI, 19, 527.

Type locality.—Masbate (Heude, l. c., p. 106) or Cebu (Heude, l. c., p. 218). Cebu (Heude); Masbate (Heude).

Sus inconstans Heude.

1892. *Sus inconstans* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 2, 67.

Type locality.—Mindanao. Mindanao (Heude).

Sus mindanensis Major.

1897. *Sus verrucosus mindanensis* MAJOR, Ann. and Mag. Nat. Hist., VI, 19, 524.

Type locality.—Ayala, Mindanao. Mindanao (Major).

Sus minutus Heude.

1892. *Sus minutus* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, 114, pl. XXB, fig. 1.

Type locality.—La Laguna to Tarlac, Luzon [see Heude, l. c., (1899), 4, 127]. Luzon (Heude).

Sus philippensis Nehring.

1886. *Sus philippensis* NEHRING, Sitz.-Ber. Ges. Nat. Freunde Berlin, No. 5, 83, May.
1888. *Sus marchei* HUET, Le Naturaliste, II, No. 20, 6, January. (Laguna Province, Luzon.)
1892. *Sus arietinus* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, 114, pl. XX, fig. 1. (Manila (?) "Je dois une tête montée du sujet dont le crâne a été dessiné à M. de la Guardia, de Manille," l. c., p. 114).
1892. *Sus effrenus* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, 114, pl. XXB, fig. 2. (Jala Jala, Laguna de Bay, Luzon.—Heude, l. c., p. 215.)
1892. *Sus microtis* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, 115, pl. 20B, fig. 6. (Jala Jala, Laguna de Bay, Luzon.—Heude, l. c., p. 216.)
1892. *Sus frenatus* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, 114, pl. 27, fig. 1, 2, 3, and 7. (Jala Jala, Laguna de Bay, Luzon.—Heude, l. c., p. 216.)

Type locality.—Luzon. Basilan (Steere); Luzon (Nehring); Mindanao (Bourns & Worcester); Mindoro (Steere); Negros (Bourns & Worcester); Panay (Bourns & Worcester); Samar (Bourns & Worcester); Sibuyan (Bourns & Worcester); Sulu (Bourns & Worcester); Tawi Tawi (Bourns & Worcester).

Family TRAGULIDÆ.

Genus **TRAGULUS** Brisson.

1762. *Tragulus* BRISSON, Regn. Anim., 2 ed., 12. *Type.*—*Tragulus indicus* BRISSON.

Mouse-deer. Pygmy deer-like ruminants without horns; toes provided with hoofs; no upper incisors; upper canines especially developed. Head and body about 575 millimeters.

Tragulus nigricans Thomas.

1892. *Tragulus nigricans* THOMAS, Ann. and Mag. Nat. Hist., VI, 9, 250, March.

Type locality.—Balabac. Balabac (Thomas).

Family CERVIDÆ.

Genus RUSA Smith.

1827. *Rusa* H. SMITH, Griffith's Cuvier, 5, 309. *Type.—Cervus equinus* CUVIER.

Deer of varying size, from small to large, with rounded antlers, only slightly curved, with brown-tine, and beam simple forked at extremity. Females without horns.

Rusa alfredi (Sclater).
1870. *Cervus alfredi* SCLATER, Proc. Zool. Soc. London, 381.

Type locality.—Philippines (received from Manila). Cebu (Elera); Guimaras (Sanchez); Leyte (Lydekker); Masbate (Sanchez); Negros (Elera); Panay (Elera); Samar (Lydekker).

Rusa culionensis (Elliot).
1897. *Cervus culionensis* ELLIOT, Field Mus. Pub. Zool., 1, No. 7 (not paged), June.

Type locality.—Culion Island. Culion (Elliot).

Rusa nigricans (Brooke).
1877. *Cervus nigricans* BROOKE, Proc. Zool. Soc. London (1877), part 1, 57, June 1.

Type locality.—Philippines. Basilan (Lydekker).

Rusa philippinus (Smith).
1827. *Cervus philippinus* SMITH, Griffith's Anim. Kingd., 4, 147.
1850. *Rusa philippinus* GRAY, Knowsley Menag., 63.

Type locality.—Philippine Islands, probably Luzon. Luzon (Lydekker).

Believed by Lydekker, Deer of All Lands, 158, to be the same as *Cervus mariannus* Desmarest, 1820, described from Ladrone Islands.

Rusa steerii (Elliot).
1896. *Cervus steerii* ELLIOT, Field Col. Mus. Pub. Zool., 1, No. 3, 72, May.

Type locality.—Basilan Island. Basilan (Elliot).

[**Rusa tavistocki** (Lydekker).
1900. *Cervus* (*Rusa*) *tavistocki* LYDEKKER, Ann. and Mag. Nat. Hist., VII, 6, 205.

Type locality.—Unknown; "probably Philippines." Probably synonym of one of the following species described by Heude.]

The following forty-one species of deer from the Philippine Islands have been named by P. M. Heude in the Mémoires concernant l'Histoire Naturelle de l'Empire Chinois.

Many of these names are surely synonyms, while a few are probably valid for species or subspecies of Philippine deer. Until series of deer skulls from all parts of the Philippine Islands, and especially from the type localities of all described forms, are assembled for study, it will be impossible satisfactorily to deal with these names. I have arranged them alphabetically by species, regardless of the genus in which they have been described. As no complete list of these names, with references and type localities, has ever been published, and for general uniformity, the reference to each name is given in full as throughout the list. No attempt has been made to improve on the combination employed by the describer.

USSA AMBROSIANUS Heude.
1888. *Ussa ambrosianus* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 27.
Type locality.—Nueva Ecija, Luzon.

USSA ATHENEENSIS Heude.
1899. *Ussa atheneensis* HEUDE, Mem. Hist. Nat. Emp. Chinois, 4, pt. 3, 138.
Type locality.—Luzon.

USSA BARANDANUS Heude.
1888. *Ussa barandanus* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 22.
Type locality.—Mindoro.

USSA BARYCEROS Heude.
1899. *Ussa baryceros* HEUDE, Mem. Hist. Nat. Emp. Chinois, 4, pt. 3, 139.
Type locality.—La Laguna and Batangas, Luzon.

MELANAXIS BASILANENSIS Heude.
1888. *Melanaxis basilanensis* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 49.
Type locality.—Basilan Island.

USSA BRACHYCEROS Heude.
1888. *Ussa brachyceros* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 36.
Type locality.—Batangas, Luzon.

MELANAXIS BREVICEPS Heude.
1888. *Melanaxis breviceps* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 48.
Type locality.—Masbate Island.

HYELAPHUS CALAMIANENSIS Heude.
1888. *Hyelaphus calamianensis* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 49.
Type locality.—Calamian, P. I.

USSA CHRYSOTRICHOS Heude.

1888. *Ussa chrysotrichos* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 39.

Type locality.—La Laguna and Batangas, Luzon.

USSA CINEREUS Heude.

1899. *Ussa cinereus* HEUDE, Mem. Hist. Nat. Emp. Chinois, 4, pt. 3, 140.

Type locality.—Cebu Island.

USSA CORTEANUS Heude.

1888. *Ussa corteanus* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 37.

Type locality.—Mariveles, Luzon.

USSA CRASSICORNIS Heude.

1888. *Ussa crassicornis* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 23.

Type locality.—Cebu.

USSA DAILLIARDIANUS Heude.

1888. *Ussa dailliardianus* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 32.

Type locality.—Jala-Jala, Laguna, Luzon.

MELANAXIS (?) ELEGANS Heude.

1888. *Melanaxis (?) elegans,* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 49.

Type locality.—Philippine Islands.

USSA ELORZANUS Heude.

1888. *Ussa elorzanus* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 28.

Type locality.—Bataan Province, Luzon.

USSA FRANCIANUS Heude.

1888. *Ussa francianus* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 24.

Type locality.— Mati, Mindanao.

USSA GARCIANUS Heude.

1888. *Ussa garcianus* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 29.

Type locality.—Nueva Ecija, Luzon.

USSA GONZALINUS Heude.

1888. *Ussa gonzalinus* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 35.

Type locality.—Philippines, probably Luzon.

USSA GORRICHANUS Heude.

1888. *Ussa gorrichanus* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 21.

Type locality.—Batangas, Luzon.

USSA GUEVARANUS Heude.
1888. *Ussa guevaranus* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 40.
Type locality.—Mariquina, Luzon.

USSA GUIDOTEANUS Heude.
1888. *Ussa guidoteanus* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 29.
Type locality.—Batangas, Luzon.

USSA HIPOLITIANUS Heude.
1888. *Ussa hipolitianus* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 39.
Type locality.—La Laguna and Batangas, Luzon.

USSA LONGICUSPIS Heude.
1888. *Ussa longicuspis* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 34.
Type locality.—Philippines, probably Luzon.

USSA MACARIANUS Heude.
1888. *Ussa macarianus* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 28.
Type locality.—Nueva Ecija, Luzon.

USSA MARAISIANUS Heude.
1888. *Ussa maraisianus* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 31.
Type locality.—Jala-Jala, Laguna de Bay, Luzon.

USSA MARZANINUS Heude.
1888. *Ussa marzaninus* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 33.
Type locality.—Nueva Ecija and La Laguna, Luzon.

MELANAXIS MASBATENSIS Heude.
1888. *Melanaxis masbatensis* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 47.
Type locality.—Masbate Island.

USSA MICHAELINUS Heude.
1899. *Ussa michaelinus* HEUDE, Mem. Hist. Nat. Emp. Chinois, 4, pt. 3, 135.
Type locality.—San Miguel de Murcia, Tarlac, Luzon.

USSA MICRODONTUS Heude.
1888. *Ussa microdontus* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 34.
Type locality.—Batangas, Luzon.

USSA NUBLANUS Heude.
1888. *Ussa nublanus* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 24.
Type locality.—La Laguna, Luzon.

USSA RAMOSIANUS Heude.
1888. *Ussa ramosianus* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 26.
Type locality.—Nueva Ecija, Luzon.

USSA ROSARIANUS Heude.
1888. *Ussa rosarianus* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 30.
Type locality.—Nueva Ecija, Luzon.

USSA ROXASIANUS Heude.
1888. *Ussa roxasianus* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 33.
Type locality.—Batangas, Luzon.

USSA RUBIGINOSUS Heude.
1888. *Ussa rubiginosus* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 38.
Type locality.—Bataan and Nueva Ecija, Luzon.

SIKELAPHUS SOLOENSIS Heude.
1894. *Sikelaphus soloensis* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 3, 147.[5]
Type locality.—Sulu.

USSA SPATHARIUS Heude.
1888. *Ussa spatharius* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 25.
Type locality.—La Laguna, Luzon.

USSA TELESFORIANUS Heude.
1888. *Ussa telesforianus* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 36.
Type locality.—Batangas (?), Luzon.

USSA TUASONINUS Heude.
1888. *Ussa tuasoninus* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 25.
Type locality.—Batangas, Luzon.

USSA VERZOSANUS Heude.
1888. *Ussa verzosanus* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, pt. 1, 37.
Type locality.—Nueva Ecija, Luzon [Heude, l. c. (1899), 4, pt. 3, 134].

USSA VIDALINUS Heude.
1899. *Ussa vidalinus* HEUDE, Mem. Hist. Nat. Emp. Chinois, 4, pt. 3, 136.
Type locality.—San Miguel de Murcia, Tarlac, Luzon.

USSA VILLEMERIANUS Heude.
1899. *Ussa villemerianus* HEUDE, Mem. Hist. Nat. Emp. Chinois, 4, pt. 3, 136.
Type locality.—San Miguel de Murcia, Tarlac, Luzon.

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[5] Heude here gives an earlier reference for this name in "Catal. des Cerfs tachetés, 1885"; but this has not been seen by me.

Family BOVIDÆ.

Genus **BUBALUS** Smith.

1827. *Bubalus* H. SMITH, Griffith's Cuvier, 5, 371. *Type.—Bos bubalus* SMITH=*Bos bubalis* LINNÆUS.

Large buffaloes (carabao and tamarao); both sexes with hollow horns.

Bubalus bubalis (Linnæus).

1758. *Bos bubalis* LINNÆUS, Syst. nat., 10 ed., 1, 72.
1894. *Bubalus kerabau ferus* NEHRING, Sitz.-Ber. Ges. Nat. Freunde Berlin, No. 8, 187, October 16. (Luzon.)

Type locality.—Rome, Italy (introduced from southern Asia). Luzon (Worcester); Masbate (Worcester); Mindoro (Worcester); Negros (Worcester).

Bubalus mainitensis Heude.

1888. *Bubalus mainitensis* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, 205.

Type locality.—Lake Mainit, Mindanao (domesticated). Mindanao (Heude).

Bubalus mindorensis Heude.

1888. *Bubalus mindorensis* HEUDE, Mem. Hist. Nat. Emp. Chinois, 2, 50, August.
1888. *Anoa mindorensis* STEERE, in SCLATER, Nature, 38, 364, August, 16.
1888. *Probubalus mindorensis* STEERE, Proc. Zool. Soc. London, 415, November 20.

Type locality.—Mindoro. Mindoro (Heude).

Bubalus moellendorffi Nehring.

1894. *Bubalus moellendorffi* NEHRING, Sitz.-Ber. Ges. Nat. Freunde zu Berlin, No. 8, 185, October 16.

Type locality.—Busuanga Island, Calamianes. Busuanga (Nehring); Culion (Trouessart).

Order SIRENIA.

Family DUGONGIDÆ.

Genus **DUGONG** Lacépède.

1799. *Dugong* LACÉPÈDE, Tabl. Mamm., 17. *Type.—Dugong indicus*=*Trichecus dugon* MÜLLER.

Large marine mammals (adults about 2.5 meters long); no posterior limbs; no nails on fore limbs; tail flattened and horizontally expanded.

Dugong dugon Müller.
1776. *Trichecus dugon* Müller, Natursyst., Suppl. und Reg., 21.

Type locality.—Cape of Good Hope to Philippine Islands, and further east toward the south pole and Straits of Magellan. Mindanao (Elera).

SPECIES ERRONEOUSLY CREDITED TO THE PHILIPPINE ISLANDS BY ELERA.

In his Catálogo Sistemático de Toda la Fauna de Filipinas, Casto de Elera records from definite islands many species of mammals which simply do not and never have occurred there. These records are probably based on misidentified specimens, as nearly all are listed as represented in the collection of the Colegio-Universidad de Santo Tomás de Manila. Some of them obviously represent species since described from the Philippines, which he had confounded with Indian or Chinese forms and are thus accounted for in the present list. The records which I have ignored as quite impossible, or too improbable for serious consideration without better evidence, are listed below. Doubtless a few of these species, or their local representatives, especially certain of the bats, will eventually prove to inhabit the Islands.

CHIROPTERA.

Phyllorhina larvata	(Hipposideros)	Luzon.
Vesperugo noctula	(Nyctalus)	Luzon.
Vesperugo maurus	(Pipistrellus)	Luzon.
Vesperugo abramus	(Pipistrellus)	Luzon.
Vesperugo tylopus	(Glischropus)	Palawan.
Vespertilio chinensis	(Myotis)	Luzon.
Vespertilio capaccini	(Myotis)	Luzon.
Vespertilio muricola	(Myotis)	Sulu.

CARNIVORA.

Viverra zibetha Negros; Palawan; Panay.
Viverricula malacensis Cagayan; Luzon.

RODENTIA.

Pteromys petaurista, Pt. philippensis, and **Pt. innornatus** (Petaurista) Palawan.
Funambulus vittatus (Sciurus) Samar.
Bandicota gigantea (Nesokia) Luzon.

PRIMATES.

Semnopithecus albipes	(Presbytis)	Sulu.
Macacus speciosus	(Pithecus)	Sulu.
Macacus nemestrinus	(Pithecus)	Luzon.

TYPE-LOCALITIES OF MAMMALS IN THE PHILIPPINE ISLANDS.

Balabac. Squirrel; *Sciurus steerii.*
Pig; *Sus barbatus balabacensis.*
Mouse-deer; *Tragulus nigricans.*

Basilan. Flying-squirrel; *Sciuropterus crinitus.*
Deer; *Rusa steerii.*
ISABELA. Pygmy Squirrel; *Nannosciurus concinnus.*
Deer; *Melanaxis basilanensis=Rusa* (?).

Bohol.
SEVILLA. Tarsier; *Tarsius fraterculus.*

Bongao. Palm civet; *Paradoxurus torvus.*
Slow Lemur; *Nycticebus menagensis* (Bongao and Tawi-Tawi).

Busuanga. Buffalo; *Bubalus moellendorffi.*

Cagayan Sulu. Fruit-bat; *Pteropus cagayanus.*
Monkey; *Pithecus cagayanus.*

Calamianes. Badger-skunk; *Mydaus schadenbergii.*
Mongoose; *Mungos parvus.*
Pig; *Sus calamianensis.*
Deer; *Hyelaphus calamianensis=Rusa* (?).

Cebu. Pig; *Sus cebifrons* (Masbate or Cebu).
Deer; *Ussa cinerus,* and *U. crassicornis=Rusa.*

Culion. Tree-shrew; *Tupaia möllendorffi.*
Squirrels; *Sciurus albicaudus* and *S. möllendorffi.*
Deer; *Rusa culionensis.*

Cuyo. Tree-shrew; *Tupaia cuyonis.*

Guimaras. Bat; *Rhinolophus hirsutus.*

Leyte. Fruit-bat; *Pteropus aurinuchalis=Acerodon jubatus.*
Tarsier; *Tarsius philippensis* (Mindanao, Leyte, and Samar).

Luzon. Shrew; *Pachyura luzoniensis.*
Bats; *Pteropus chinensis=Pt. leucopterus, Rhinolophus anderseni* (?), *Rh. philippinensis,* and *Rh. arcuatus.*
Palm civet; *Paradoxurus philippinensis.*
Rats, etc.; *Phloeomys cumingi* and *Ph. pallidus.*
Monkey; *Maccacus fur=Pithecus syrichta,* and *Pithecus syrichta.*
Pig; *Sus philippensis.*
Deer; *Rusa philippinus, Ussa atheneensis,* and *U. gonzalinus=Rusa.*

BAGUIO, BENGUET. Rat; *Epimys calcis.*

BATAAN PROVINCE. Deer; *Ussa elorzanus* and *U. rubiginosa=Rusa.*

BATANGAS. Deer; *Ussa baryceros, U. brachyceros, U. chrysotrichos, U. gorrichanus, U. guidoteanus, U. hipolitianus, U. microdontus, U. roxasianus, U. telesforianus,* and *U. tuasoninus=Rusa.*

CAMP JOHN HAY, BENGUET. Rat; *Apomys musculus.*

LUZON—Continued.

DARAGA, ALBAY. Bat; *Ptenochirus jagorii.*

HAIGHTS-IN-THE-OAKS, BENGUET. Rats; *Epimys querceti, Tryphomys adustus, Batomys dentatus,* and *Apomys major.*

HIGHLANDS OF NORTHERN LUZON. Rats, etc.; *Celænomys silaceus, Chrotomys whiteheadi, Rhynchomys soricoides, Epimys luzonicus, Batomys granti, Carpomys melanurus,* and *C. phæurus.*

ISABELA. Bat; *Kerivoula whiteheadi.*
Rats, etc.; *Crunomys fallax.*

JALA JALA. Pigs; *Sus microtis* and *S. frenatus.*
Deer; *Ussa dailliardianus* and *U. marisianus=Rusa.*

LA LAGUNA. Pig; *Sus marchei.*
Deer; *Ussa baryceros, U. chrysotrichos, U. hipolitianus, U. marzaninus, U. nublanus,* and *U. spatharius=Rusa.*

LA LAGUNA and TARLAC. Pig; *Sus minutus.*

MANILA. Flying lemur; *Galeopithecus philippinensis=Cynocephalus volans.*
Bats; *Eleutherura philippinensis=Rousettus amplexicaudatus, Pteropus pyrrhocephalus=Acerodon jubatus, Acerodon jubatus, Vespertilio alecto=Emballonura monticola, Rhinolophus rufus,* and *Rh. subrufus.*
Monkeys; *Macacus philippinensis=Pithecus syrichta* and *Macacus palpebrosus=P. syrichta.*
Pig; *Sus arietinus* (?).

MARIQUINA. Deer; *Ussa guevaranus=Rusa.*

MARIVELES. Deer; *Ussa corteanus=Rusa.*

MOUNT DATA. Rats, etc.; *Epimys datae* and *Crateromys schadenbergi.*

NUEVA ECIJA. Deer; *Ussa ambrosianus, U. garcianus, U. macarianus, U. marzaninus, U. ramosianus, U. rosarianus, U. rubiginosus,* and *U. verzosanus=Rusa.*

PAMPANGA. Flying lemur; *Cynocephalus volans.*

PARACALI. Bats; *Emballonura discolor=E. monticola, Rhinolophus rufus=R. subrufus, Hipposideros antricola,* and *H. obscurus.*

SAN MIGUEL DE MURCIA, TARLAC. Deer; *Ussa michaelinus, U. vidalinus,* and *U. villemerianus=Rusa.*

SOUTH CAMARINES. Bat; *Rhinolophus virgo.*

S. MATHEO CAVE. Bat; *Hipposideros diadema griseus.*

VOLCANO YRIGA, CAMARINES. Bat; *Cynopterus luzoniensis.*

Malanipa. Fruit bat; *Pteropus speciosus.*

Masbate. Pig; *Sus cebifrons* (Masbate or Cebu).
Deer; *Melanaxis breviceps* and *M. masbatensis=Rusa* (?).

Mindanao. Fruit bat; *Acerodon jubatus mindanensis.*
Squirrels; *Sciurus mindanensis* and *S. philippensis.*
Slow lemur; *Nycticebus philippinus=N. menagensis.*
Tarsier; *Tarsius philippensis* (Mindanao, Leyte, and Samar).
Pigs; *Sus incostans.*

ALAYA. Pig; *Sus mindanensis.*

DAVAO. Palm civet; *Paradoxurus minax.*
Squirrel; *Sciurus cagsi=S. mindanensis.*
Rats and mice; *Epimys kelleri* and *Mus commissarius.*
Tarsier; *Tarsius carbonarius.*

GRAND MALINDANG MOUNTAIN. Shrew; *Crocidura grandis.*

LAKE MAINIT. Buffalo; *Bubalus mainitensis.*
Bat; *Hipposideros coronatus.*

MATI. Deer; *Ussa francianus=Rusa.*

MERCEDES. Bat; *Taphozous pluto.*

MOUNT APO. Woodshrew; *Podogymnura truei.*
Tree shrew; *Urogale cylindrura.*
Bat; *Rhinolophus inops.*
Rats, etc.; *Crunomys fallax, Epimys albigularis, E. mindanensis, E. todayensis, E. vulcani, E. v. apicis, Bullimus bagobus, Limnomys sibuanus, Tarsomys apoensis, Apomys hylocætes, A. insignis,* and *A. petræus.*
Monkey; *Pithecus mindanensis apoensis.*

MOUNT BLISS. Shrew; *Crocidura beatus.*
Rat; *Apomys bardus.*

PANTAR. Fruit bat; *Pteropus vampyrus lanensis.*
Rat; *Epimys pantarensis.*
Monkey; *Pithecus mindanensis.*

TAGULAYA. Rat; *Epimys tagulayensis.*

ZAMBOANGA. Tree shrew; *Urogale everetti.*
Bat; *Rhinolophus arcuatus exiguus.*
Rats; *Epimys magnirostris* and *E. zamboangæ.*

Mindoro. Bat; *Harpyionycteris whiteheadi.*
Deer; *Ussa barandanus=Rusa.*
Buffalo; *Bubalus mindorensis.*

ALAG RIVER. Bat; *Chilophylla hirsuta.*
Rat; *Epimys gala.*

MOUNT DULANGAN. Rat; *Epimys mindorensis.*

MOUNT HALCON. Shrews; *Crocidura halconus* and *C. mindorus.*

Negros. Rat; *Epimys negrinus.*

Palawan. Tree shrew; *Tupala ferruginea palawanensis.*
Badger-skunk; *Mydaus marchei.*
Squirrel; *Sciurus juvencus.*
Pig; *Sus ahoenobarbus.*

IWAHIG. Bear-cat; *Arctictis whitei.*
Mongoose; *Mungos palawanus.*
Rat; *Epimys luteiventris.*

PUERTO PRINCESA. Flying squirrel; *Sciuropterus nigripes.*
Porcupine; *Thecurus pumilus.*
Pig; *Sus barbatus palavensis.*

Palmas. Fruit bat; *Pteropus pumilus.*

Panay. CONCEPCION. Fruit bat; *Acerodon lucifer.*

Philippine Islands. Shrews; *Crocidura grayi.*
Bats; *Cynopterus philippensis=C. luzoniensis, C. cumingii=C. luzoniensis, Pteropus leucopterus, Taphozous philippinensis, Megaderma philippinensis=M. spasma, Hipposideros pygmæus, Vespertilio rufopictus=Myotis formosus, Myotis macrotarsus, Vespertilio meyeni=Pipistrellus irretitus, Vespertilio eschscholtzii=Miniopterus schreibersii, Miniopterus tristis,* and *Kerivoula pellucida.*
Rats and mice; *Epimys everetti* and *Mus castaneus.*
Monkey; *Macacus cynomolgus cumingii=Pithecus syrichta.*
Deer; *Rusa alfredi, Rusa nigricans, Melanaxis* (?), *elegans,* and *Ussa longicuspis=Rusa.*

Samar. Bats; *Kerivoula jagorii.*
Squirrels; *Nannosciurus samaricus* and *Sciurus samariensis.*
Tarsier; *Tarsius philippensis* (Mindanao, Leyte, and Samar).

Sulu. Shrew; *Pachyura edwardsiana.*
Gibbon; *Hylobates funereus.*
Deer; *Sikelaphus soloensis=Rusa.*

CRATER LAKE MOUNTAIN. Monkey; *Pithecus suluensis.*

Tawi Tawi. Slow lemur; *Nycticebus menagensis* (Tawi Tawi and Bongao).

Ticao. Rat; *Epimys tyrannus.*

NOTE TO SPORTSMEN AND TRAVELERS ON THE PRESERVATION OF SPECIMENS.

The average traveler little realizes what he may do for zoology. It is in the power of sportsmen, especially, to enrich museum collections, at little trouble to themselves, with the many valuable specimens which come into their hands, and for which they have no personal use. The skins and skulls of all animals killed should be carefully preserved and deposited, with full data, in some institution of standing; it will surprise the average sportsman to find how gladly they are received and what scientific interest is attached to material he assumes to be worthless.

The making of study skins of small mammals is really a very simple process and one of considerable interest; and the pleasures to be realized from trapping add greatly to a traveler's experiences. A small pamphlet issued by the United States National Museum gives instructions for preparing specimens of mammals in the most approved styles for scientific study. To the sportsman, the greatest interest naturally lies in the medium sized and larger mammals, the skins of which, when intended chiefly for study, are easily prepared. A primary incision should be made from the breast to the tip of the tail, and other incisions from the sole of each foot up the leg to the main longitudinal cut. In horned mammals, an additional cut from the base of the head to between the horns, branching in a Y to around each horn is necessary; the skull in these being removed through this opening. The skin is then removed entire, special care being taken to skin out the feet, tail, ears, and lips. The skin should then be well salted, the salt rubbed in on the most fleshy parts and around the edges. It is a good plan to separate the skin of the ear from the cartilage and force salt to the tip, salting the feet well also. The skin may then be rolled up for a few hours, as over night, and afterward spread out *in the shade* to drain and dry. As the drying process advances, the skin may be folded, before too dry, into a convenient bundle for transportation. The skull, which should always accompany the skin, may be disjointed from the vertebræ, care being taken not to cut or otherwise injure its base. The flesh should be roughly cut off, the brain removed through the natural opening at back of skull with a folded and bent wire, and the skull dried in the sun or near a fire. The skin and skull of the same individual should always be tagged with the same number so that there will be no uncertainty as to what skull belongs with a particular skin when the specimens reach the museum.

Even when it is not possible to save the skin, or when it is desired for other purposes, the skull of a medium sized or large mammal should always be saved. Large series of skulls from all localities are greatly desired for study and comparison. Where the sportsman wishes to retain the horns they may be sawed off, either alone or with a portion of the bone of the frontal region, and the specimen will still be of great service to the specialist, to whom the teeth and lower surface of the skull are more important than the horns. When this is done a photograph of the skull before the horns are removed should be taken, to accompany the specimen. Weathered skulls, particularly when the full set of teeth is present, are often of great value when their exact locality is known.

Specimens should be labeled with the exact locality where the animal was killed, the date, sex, and the collector's name. The length of the animal before skinning, from nose to root of tail, the length of the tail vertebræ, and length of hind foot are valuable measurements and should be taken if the time and conveniences are available.

Bats are always important and may be preserved entire in spirits, or in a weak solution of formalin; a small incision in the belly will allow the fluid to enter the cavity and aid in preservation. Alcohol and formalin must not be used at their full strength. Add to commercial alcohol (95 per cent) one-fifth its volume of water. Add to commercial formalin 15 times its volume of water.

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THE ANATOMY OF ACLESIA FREERI NEW SPECIES.

By LAWRENCE EDMONDS GRIFFIN.[1]
(*From the Zoölogical Laboratory, University of the Philippines.*)

DIAGNOSIS.

Body from 13 to 20 centimeters long, not contracted behind the head, sloping upward to the inhalent siphon, descending abruptly behind; entirely covered with simple and compound dermal processes, the largest of which may be 5 centimeters long, a large dermal process between the eyes; another is usually found between the tentacles. Foot extending to posterior extremity of body, sharply pointed behind, broader than body. Ground-color, light gray, overlaid with yellow dots and black markings so that the general effect is olive-green.

Two or three rows of large peacock-blue spots, each surrounded by a narrow brown line, extend along the back and sides of the body. Anterior end of branchial fissure a little in front of the middle of the body. Tentacles large, 25 to 30 millimeters long; rhinophores more slender and tapering, almost as long as the tentacles. Apparently this is the largest described member of the genus.

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HABITS AND EXTERNAL CHARACTERS.

My attention was called to the presence of this species in Manila Bay by Mr. Dean C. Worcester, about February 1, 1909. The animals were then congregated in enormous numbers for miles along the coast, just below low tide level. At the spot where they were first discovered, there were areas where the animals were so numerous that it was impossible to move without treading on them, and the outstretched hand would cover three or four almost everywhere it could be placed. The aclesias were then engaged in depositing their eggs which are produced in enormous numbers. The egg capsules are inclosed in a cord of greenish mucus, one of which when unraveled proved to be 27 meters in length. The tangled egg-masses are attached, if possible, to stakes or stones; sometimes one animal after another deposits its eggs at the same place, until there is an accumulation sufficient to fill a large pail. An immense number of the egg masses which are deposited on the bottom are washed ashore, forming a windrow which extends along the beach for miles. As the eggs develop, the color of the mass changes to light brown. The egg masses are eaten by many persons in the form of a salad, dressed with vinegar and olive oil. The aclesias themselves also serve as food to a limited extent, the thick body-wall being cooked and eaten. In the years 1909 and 1910, the aclesias first appeared along the shore of the bay near Manila about the first of February. During the middle of the month, their numbers and egg-laying activities were greatest; then the number of aclesias lessened day by day. Few were left at the end of the month, and after the first week of March it was impossible to find any of them along the beach.

The first individual and eggs of the next season were found December 4, 1910; the principal activity in egg-laying occurred during January, 1911, instead of in February as in the previous years. Many aclesias, however, remained along the shore until the last week of February. Other duties rendered it impossible to determine the extent of coast line along which the aclesias appeared during the years mentioned.

The author has found this aclesia to be an extremely useful form to use in his classes. The supply appears to be regular and unlimited.[1]

The animals are of large size, clean in appearance and odor, and all adults; while the character of the body wall is such that the internal organs are completely exposed by a few cuts with the scissors. By using a hypodermic injection of cocaine and atropine the animals can be killed fully extended. They are well preserved by either alcohol or formalin. It has been found, however, that the albumen gland must be well hardened, or it will swell and break down into a gelatinous substance. The dissection of aclesia is not without its difficulties, but this aclesia is, in the opinion of the author, the best gasteropod form for general class work with which he is acquainted.

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[1] In 1912 no aclesias had appeared by March 11, the date on which the author left Manila.

When crawling upon the bottom, even in clear shallow water, these mollusks are not conspicuous, although easily distinguished and followed when once found by the eye. Their colors blend well with the sandy bottom, rendering them much less conspicuous objects than one would think from observing the animals in an aquarium, where color and form show to the greatest advantage. There is considerable variation in size among the specimens collected, but the average is about 15 centimeters long, 7 centimeters wide, and 5 centimeters high. The posterior extremity extends some distance back of the visceral mass, forming a broad, pointed tail. The creeping sole extends to the tip of this part. The sides of the foot extend beyond the margins of the body.

The highest point of the body is at the level of the anterior end of the branchial fissure. The slope from here to the head is even and gradual, but abrupt and steep to the tail.

The dorsal surface of the head and neck is considerably flattened. The head is distinctly separated from the foot (fig. 10, Plate III), but there is no dorsal or lateral demarcation between the head and the broad, thick, neck region. The lips, which inclose the large ventral mouth, are white in color, thick, and creased. They form a flattened area of considerable extent which is applied to the surface on which the animal is creeping. At each side of the mouth, the head is produced into a pair of large oral lobes, almost directly beneath the tentacles. The ventral edge of the oral lobe is formed by an extension of the lip. The tentacles arise from the latero-anterior angles of the head; they are long and large, tapering little from base to tip. The auriculate tip is directed somewhat posteriorly, and extends in the form of a small fissure down the posterior surface of the tentacle about two-fifths of its length. When the aclesias move about, the flattened surface of the tentacle is spread on the bottom like the palm of a hand. The rhinophores are about as long as the tentacles, but more tapering. Their fissures extend from base to tip of the posterior side; except at the tip, the margins of the fissure are usually rolled tightly upon each other. When the rhinophores are fully extended their bases meet in the midline to a height of 6 to 10 millimeters above the surface of the head, making them appear to spring from a transverse elevation of the head. When retracted, they appear to be widely separated. The bases of the tentacles do not approach each other closely, even when most fully extended.

The eyes lie on the line connecting the centers of the bases of the tentacle and rhinophore, slightly nearer the rhinophore than the tentacle. In life, the minute, black eye is surrounded by a narrow ring of bright yellow, which renders the eyes fairly conspicuous. After preservation, the color about the eyes fades, and the eyes seem to become somewhat depressed by the contraction of the skin so that it becomes difficult to find them.

The entire dorsal and lateral surfaces of the body are covered (excepting only the oral lobes) by slender villi of different sizes; the small ones simple, the larger ones more or less branched. Scattered over the surface of the body are good-sized, conical elevations of the skin, made more distinct by the radial, black lines or spots with which they are marked, and frequently covered with villi. Between the bases of the villi, the skin is covered by numerous, extremely fine, dermal papillæ scarcely distinguishable without a hand lens, and only to be observed in well expanded, living animals. Some specimens are found in which practically all the villi are short and simple. In others, the villi are fewer in number, long, and complexly branched. Even the tentacles and rhinophores may carry large compound villi. The number of branches possessed by a large villus can only be determined when it is fully expanded, for the contractility of these processes is so great that a large and highly complex villus when contracted may appear as a tubercle on the surface of the body from which project only one to three small simple villi. A curious feature of the villi, both large and small, is the presence of ridges, or angles, extending from base to tip. There are always two, and frequently three, of these. Branches, or secondary papillæ, always arise from these ridges. A large papilla, which arises from the middle of the dorsum of the head, about equidistant between the tentacles and rhinophores, appears to be a constant feature. When fully extended, it is of about the same size as these other organs, and appears much like an extra tentacle. Preserved specimens show scarcely a trace of it. Another large papilla may arise from the anterior edge of the head between the tentacles, but does not appear to be so constant in its development as the one previously mentioned.

The tissues of the body wall and foot are delicate and translucent; this character combined with the pleasing coloration render *Aclesia freeri* a much handsomer animal than most large tectibranchs. Viewed with the naked eye, the ground-color appears to be olive, but under a lens it is seen to be a very light gray. Black dots and lines are so closely placed upon this that the ground-color in most places is reduced to small irregular dots, not distinguishable without a hand lens. The sole of the foot is lighter in color than the body because the overlying color is light brown, and its markings are much finer and more evenly distributed than those of the body.

The tips of the minute papillæ, which have been mentioned previously, are white, and thus a finely regular, whitish speckling of the skin is produced.

About and on the bases of the larger villi, the black markings have the form of complete or incomplete rings, crescents, and irregular flecks of vivid black. Between the bases of the villi are numerous irregular areas where the black markings unite, producing a fine black network inclosing minute gray areas and the small white-tipped papillæ previously referred to. The black markings of the larger papillæ become finer and finer toward the tip; to the naked eye, no black is visible in the terminal portion of the papillæ. The ground color, also, changes from gray to tan, or even reddish-brown, with or without minute dots of canary-yellow. The spots of the last-mentioned color are widely distributed over the body of some specimens and lacking in others.

The brilliant eye-like spots of peacock-blue are subject to extreme variation. In general, two fairly well-defined rows may be distinguished. One row extends along the side of the body, 10 to 20 millimeters above the foot; the other commences back of the tentacle and passes along the back parallel with, and about 1.5 centimeters distant from, the branchial fissure. Sometimes a third row appears, close to the margin of the fissure. The color of these spots is very uniform. When examined with a lens, the blue appears to be flecked with bright spots, appearing like the metallic paints often used on children's toys. The spots are ordinarily fairly uniform in size, and from 3 to 5 millimeters in diameter. Occasionally one finds a specimen having a number of small blue spots, 1 millimeter or less across, about the bases of the rhinophores. The smallest spots are entirely blue, but the larger and more usual ones have dark centers, marked and colored like the general surface of the body. Each spot is finely margined with black, outside of which is a second equally fine ring of gray to brown.

In certain lights, the foot shows a beautiful violet iridescence, possibly due to the layer of mucus covering it. During life, the gizzard, hermaphrodite gland, and anterior genital mass show through the tissues of the foot. The expanded oral surface, the ventral edges of the oral lobes, and the groove separating the head from the foot are very lightly pigmented.

The parapodial lobes are separated for more than half their length by the branchial fissure, but fused with each other posterior to this (fig. 1, Plate I). At the level of the anterior end of the branchial fissure they are joined to the body wall from the seminal furrow to the margin of the foot (fig. 8, Plate II). A large contractile sac is thus formed which surrounds, but is not attached to, the visceral mass of the body, within which lies the large branchia, and into which open the anus and the renal and reproductive pores. The branchial fissure lies slightly to the right of the median dorsal line. During inspiration, the anterior end of the branchial fissure (inhalent siphon) expands, and its margins are elevated, while the posterior extremity closes. The parapodial sac enlarges so as considerably to increase the space between its wall and the body. When expiration begins, the anterior opening closes suddenly, the posterior (exhalent siphon) opens, and the water inclosed by the parapodial sac is expelled by the contraction of the walls of the sac with considerable force, a force sufficient to carry all refuse well beyond the end of the tail. The anal papilla lies immediately below the exhalent siphon (fig. 8, Plate II). It can be extended so as to bring the anus almost into the exhalent siphon (fig. 9, Plate II) and thus discharge fæcal materials into the outpassing current in such a manner that they will be completely carried away.

The division between the right and left parapodia is maintained anteriorly by the seminal furrow, which passes from the genital orifice over the dorsum and right side (fig. 8, Plate II), to the penial pore, just below the right tentacle.

The body wall, parapodial lobes, and foot are translucent and appear to be composed largely of a gelatinous connective tissue. There is present, however, a considerable amount of muscle tissue in these parts, and they shrink little in properly preserved specimens. The parapodia are traversed by numerous muscle strands passing from the outer to the inner wall. An irregular network of larger muscle bands lies next to the internal surface, which can be clearly seen when the parapodia are reflected. Outside of the horizontal muscle layer, but close to the internal surface of the parapodium, is a network of venous sinuses which forms a quite definite layer (fig. 8, Plate II).

There being no trace of a shell, the mantle is reduced to a ridge which passes from near the anterior side of the branchial cavity around the left end of the gill, finally ending behind the gill near the base of the anal papilla. The pericardium and nephridium lie to the left of the ridge, raised somewhat above the general level of the floor of the branchial chamber. The highest part of the mantle vestige, near the posterior end, projects from 5 to 7 millimeters, sufficient to enable it to overlie a few small plates of the posterior end of the branchia. The anterior end of the mantle ridge is brillant black, and is composed of denser tissue than the remander of the ridge. The posterior extremity of the mantle ridge is also pigmented.

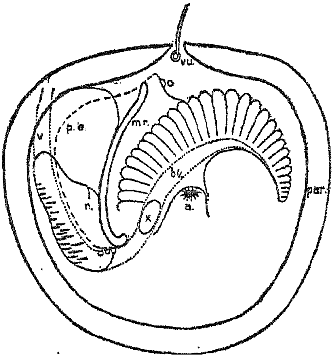


FIG. 1.—Diagram of the pallial complex of *Aclesia freeri* sp. nov.: *a*, anal papilla; *bv*, afferent branchial vein; *mr*, mantle ridge, i. e., the projecting free margin of the reduced mantle; *n*, nephridium; *o*, osphradium; *par*, parapodium; *p. e.*, pericardium; *v*, vein of left side of body running beneath the pericardium and nephridium; *vu*, vulva; *x*, aperture by which the blood from the hæmocœl and veins of the right side of the body enters the branchial vein.

These aclesias have the power, possessed by most tectibranchs, of emitting a purple dye when they are greatly disturbed by handling, or when the water in which they are kept becomes unbearably stale.

The dye is emitted by this species in smaller quantity and with more reluctance than by any other aplysiid with which I am familiar. The great majority of the specimens which have been killed, either by asphyxiation or by narcotization, have died without giving forth any trace of dye.

The dye is produced from the pigmented areas at the anterior and posterior ends of the mantle ridge, the anterior region producing the greater amount. The pigmented areas of the mantle ridge can be squeezed in a moribund aclesia, when the purple dye will issue from the skin; at the same time the pigmentation disappears. The black pigment of these spots can all be pressed out, coloring the water purple as it appears, until the skin is white.

The renal pore is located in the pigmented area at the posterior extremity of the mantle ridge.

The true mantle cavity extends farther beneath the base of the gill than is at first apparent. The dotted line in text figure 1 indicates the limit of the mantle cavity. From this it will be seen that a considerable part of the pericardium and of the nephridium is included in the base of the mantle.

The branchia is large (65 millimeters long, 25 millimeters wide, and 15 millimeters thick). It is attached to the mantle and body wall by a broad base which follows approximately the curve of the mantle ridge. The free extremity of the branchia curves to the right and backward, ending well back of the anal papilla. Both dorsal and ventral sides of the branchia are subdivided into leaflets, upon the outer edges of which the afferent branchial veins are prominent. The dorsal and ventral series of leaflets are widely separated by a deep groove on the anterior face of the branchia. The color of the branchia is gray or greenish, punctate with numerous black dots.

The anal papilla stands just below the exhalent siphon and within the arc of the posterior side of the gill. Within the inspiratory aperture and a little to the right is the opening of the vulva. The thin-walled pericardium occupies the area on the left side of the body between the mantle ridge and the anterior margin of the branchial chamber. The triangular nephridium forms the posterior border of the pericardium, and extends backward as far as the posterior extremity of the mantle (fig. 8, Plate II). The visceral mass back of and below the kidney is covered by a thin, semitransparent body wall, which is pigmented in extremely fine black dots. The outlines of the liver and hermaphrodite gland, and portions of two coils of the intestine can be seen through the kidney and pericardium.

On the right side of the branchial chamber, we find beneath the branchia and in front of the anus, an elevation caused by a portion of the reproductive system (the "anterior genital mass").

The hypobranchial gland consists of an area of dermal glands which lie in the floor of the branchial cavity, commencing at the right side of the genital orifice, and extending backward along the right side at least as far as the level of the anal papilla. The thickening of the dermis in the glandular area is noticeable;

the color there is lighter than on the surrounding parts. The gland appears to secrete large quantities of mucus, but no dye seems to be produced there, nor does the secretion have a disagreeable odor, as in some other aplysiids.

INTERNAL ANATOMY.

The osphradium lies in the angle under the extreme anterior end of the base of the branchia (text figure 1). It has the form of an oval papilla, only slightly raised above the surrounding surface; it is depressed a little at the center, where the osphradial ganglion is in contact with the dermis.

The pericardium is thin-walled and occupies the space between the mantle rim and the anterior wall of the respiratory chamber. It is bounded posteriorly and overlapped by the nephridium, which is light-colored and somewhat elevated. The lateral (left) border of the kidney is approximately parallel to the mantle rim, although in most cases the posterior end of the kidney is much narrower than the anterior. The external aperture of the kidney, the reno-branchial pore, is found on a thickened and pigmented area at the posterior extremity of the mantle rim, to the left of the base of the anal papilla. The anterior and lateral portions of the nephridium are composed of solid glandular substance. The postero-median region contains but little glandular tissue, which lines the walls, while the central part is occupied by a more or less distinct cavity. The lateral edge of the nephridium lies over the large vein which collects blood from the left side of the body. Numerous minute openings are visible in the surface of the nephridium which lies against the vein. The pericardium and nephridium lap to such an extent that nearly one-half of the latter overlies the pericardium. The reno-pericardial pore is formed at the extreme posterior end of the pericardium, close to the angle formed by the dorsal, posterior, and median walls.

Veins from the nephridium open directly into the left side of the auricle.

ALIMENTARY SYSTEM.

The narrow, slit-like mouth lies in the middle of a nearly circular, flat, oral plate, the thickened skin of which is raised in radiating, pleated ridges (fig. 10, Plate III). The flattened, free edges of the ridges are white, while the grooves between them are flecked with black spots. The ventral edges of the oral lobes are continuous with the surface of the oral plate. Just within the lips, each side of the buccal cavity is armed by a flat, horny, mandibular plate, of the shape shown by text figure 2. Each plate is composed of fine rodlets, which are inclined to the surface in such a way that they overlap each other, leaving only the heavy, bluntly-pointed ends projecting and pointing toward the concave anterior border.

The pharynx (buccal mass) is large and muscular, the intrinsic circular and longitudinal muscles, as well as its retractors and protractors, being well developed and defined (fig. 15, Plate III). The tongue is large and firm, is quite regularly ovoid in shape, and occupies most of the floor of the pharynx (fig. 13, Plate III). The anterior surface presents a median point, from which a frenum-like ridge extends along the floor of the pharynx to the mouth; the posterior end of the tongue overhangs the base. The radula is light brown, broad, depressed along the median line, acutely pointed at the anterior end, and rounded posteriorly. The widest part of the radula lies upon the posterior face of the tongue. Absorption of the lateral teeth commences at the posterior limit of the anterior face of the tongue and proceeds inward from this point, resulting in the pointed anterior end of the radula already referred to. The radular sheath lies under the posterior end of the tongue, and is broad and shallow. A transverse arcuated fold of the floor of the pharynx lies behind and parallel to the base of the tongue.

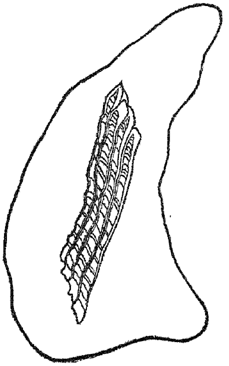


FIG. 2.—Outline of a mandibular plate of *Aclesia freeri* sp. nov. The figure within the outline represents four of the rods of which the plate is composed. The concave border of the plate is anterior. Actual dimensions, 5 millimeters high, 3 millimeters wide at bottom, 1 millimeter wide at top.

On each side a broad fold of mucous membrane projects from the lateral wall of the pharynx above the posterior portion of the tongue. In the unopened pharynx the free medial edges are applied closely to each other, completely separating the anterior, muscular-walled part of the pharyngeal cavity which contains the tongue, from a thin-walled posterior portion which opens directly into the œsophagus. The inner (ventral) surfaces of the folds are fairly smooth, the outer surfaces corrugated. The apertures of the salivary ducts are on the inner surfaces of these folds, near their anterior extremities. The mucous membrane of the pharynx is pigmented in black spots and lines.

The radula sac opens by a V-shaped aperture in the middle of the posterior half of the dorsum of the tongue. The posterior wall of the sac is folded into it, so as to lie against the lateral walls. The sac is deep, extending obliquely downward and forward to the base, and almost to the anterior extremity of the tongue.

The radula (figs. 27, 28, and 29, Plate IV) consists of two portions; one lying upon the dorsal and anterior surface of the tongue, the other bending sharply at right angles to the first portion, and lying on the posterior face of the tongue and in the radula sac. The central part of the exposed portion of the radula is considerably raised above the margins, and at the anterior end forms a high sharp ridge, where the central teeth are apparently the only ones used. The center of the posterior portion of the radula, on the contrary, is greatly depressed.

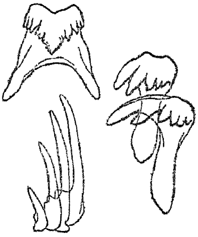


FIG. 3.—Central tooth, first and second inner laterals, and four outer lateral teeth of the radula of *Aclesia freeri* sp. nov.

The radular teeth are of the type common to the family, and little different from those of other known species of aclesias. Text figure 3 represents the central tooth, the first two lateral teeth, and the four outermost lateral teeth of a row. A detailed description would be superfluous.

The inner surface of the anterior and ventral part of the pharynx is covered by a fairly heavy, chitinous cuticula which bears numerous spines of the kind shown in text figure 4. They are of two kinds; in the anterior region the spines are short, thick, and sharply pointed; posteriorly, there are patches of long, slender, blunt spines which seem to be totally lacking in rigidity, and are more like cuticula-covered villi than spines.

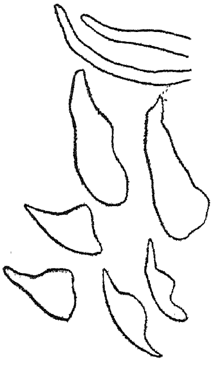


FIG. 4.—Cuticular spines or thorns upon the inner surface of the pharynx of *Aclesia freeri* sp. nov. The four spines at the bottom are from the anterior, the ones above from the posterior region of the part of the pharynx thus armed.

The long (35 to 40 millemters), lobulated, salivary glands lie parallel to the œsophagus (fig. 12, Plate III); their posterior ends are loosely attached to the surface of the gizzard. The ducts of the salivary glands pass under the posterior edge of the outermost circular muscle layer of the pharynx until they reach the dorsal surface of this organ. They then turn forward for a distance of from 3 to 4 millimeters, beneath the muscular wall, and finally open into the pharyngeal cavity near the anterior ends of the lateral lamellæ, as previously mentioned (page 74).

The œsophagus is a straight tube about 25 millimeters in length. Its mucous membrane is thrown into numerous, straight, longitudinal folds. The œsophagus opens into a thin-walled saccular crop, about 12 millimeters long by 15 millimeters in diameter. The opening of the œsophagus into the crop is guarded by a strong sphincter muscle and, also, by an annular fold of the mucous membrane of the œsophagus, which projects backward into the crop (fig. 13, Plate III). The mucous membrane of the crop is smooth.

The crop is followed by a muscular, barrel-shaped gizzard, 12 millimeters long by 17 millimeters in diameter. The muscular wall of the gizzard consists of a thick, complete ring of circular muscles, thickest at the center and thinning regularly toward each end. The interior of the gizzard is almost completely filled by roughly pyramidal, chitinous "stomach-plates," usually about 10 in number, which occupy the greater part of the wall. A row of from 9 to 11 small plates stands in front of these. The plates have about the same consistency as fresh hyaline cartilage, and are of a light coffee-color. The food of the animal consists of the animal and plant substances which are mixed with the bottom sand, which must be very effectively ground in passing through the narrow passages between these plates. It appears probable that the trituration of the food is accomplished more by the sand grains which are mixed with it than by the direct action of the stomach plates. The arrangement of the latter is such as to leave only tortuous, narrow passages through the gizzard when that organ is relaxed. When its muscular walls contract, the sand grains contained in the passages will be pressed against each other and against any food substances present, producing a comminuting action much more effective than can be attained by the direct action of the large, blunt, and somewhat soft plates. The large stomach plates are bluntly pointed, with the points directed slightly backward. Each plate presents 3 or 4 prominent, somewhat irregular, but not sharp edges (figs. 17 and 18, Plate III). The bases of the plates are slightly convex and, in general, ovoid in outline. The center of the plate is occupied by an axial column of darker color and slightly harder material than the outer part, which is exposed upon the worn tip of the plate.

The plates are composed of numerous, thin layers, parallel to the base. Each layer consists of prismatic columns, which are superposed, or coincide, from layer to layer. Each plate is situated on an epithelial bed with slightly elevated margins, the shape of which corresponds to the shape of the bottom of the plate. An area is visible in the center which corresponds to the base of the axial column of the plate.

The smaller plates of the anterior row are more slender, and pointed, and are considerably curved toward the interior part of the gizzard (fig. 19, Plate II). It is noticeable that the small stomach-plates are all found on the anterior edge of the gizzard, while the largest plates are found in the posterior row. Among the anterior plates, also, and located on the extreme anterior edge of the gizzard, often may be found minute plates in the first stages of growth. This arrangement suggests that possibly new teeth are continually being produced at the anterior edge of the gizzard, which gradually move backward as they grow, room being made for them by the reabsorption, or falling away, of the most posterior plates. Such a process would be essentially similar to the forward movement of the bands along which the nautilus is attached to its shell as its body moves forward in the growing shell.

The axial column is the first part of the plate to be formed, growing from a minute, subtriangular, flat, epithelial elevation at the anterior edge of the gizzard. The outer coating is then formed around this, almost entirely, at first, upon the posterior side, where it frequently develops in a second point. The axial column is the more sharply pointed of the two; its tip is not covered by the secondary deposit until the plate is of considerable size. A second axial column develops just in front of the first, fused with the first at its base, but with freely projecting tip. With further growth of the plate, the axial column now develops as a single structure, while the double point becomes worn away. The outer substance is formed in considerable thickness upon the anterior surface of the axial column, while it remains as a thin layer upon the sides. As a result of this method of deposition, the axial column usually extends almost completely across the plate and forms the entire grinding surface, and the outer substance forms considerable masses anterior and posterior to the axial column (figs. 17 and 19, Plate III). The surfaces of the axial column are iridescent.

The elongated conical stomach, which follows the gizzard, shows no definite demarcation from the intestine. It is about 35 millimeters in length, and curves to the right under the liver. The hepatic duct opens into the stomach by a large aperture on the dorsal side (fig. 21, Plate IV). Projecting from the inner surface of the stomach are numerous, slender, sharp-pointed spines of the same composition and structure as the plates of the gizzard, and arranged in a definite and constant manner (fig. 13, Plate III). They pass in two rows completely around the stomach, the first row being close to, and paralled with, the posterior margin of the gizzard. The plane of the second ring is perpendicular to the axis of the stomach. Therefore, it lies about 5 millimeters behind the first ring on the dorsal side of the stomach, but 15 millimeters behind it ventrally. Where the rows approach each other dorsad, they are connected by a short broad band of similar spines. The bands of epithelium on which the spines stand appear to be somewhat modified, being slightly lighter in color and smoother than the remainder of the stomach epithelium. The aperture of the hepatic duct lies directly behind the median dorsal band of spines. It is large, but is guarded by what appears to be an efficient, although peculiar, device (figs. 13 and 14, Plate III). At the anterior edge of the aperture stands a large conical stomach plate, which is inclined backward over the aperture. As this plate stands close to the posterior end of the short dorsal band of spines, it may possibly be considered as the hindmost and most developed one of the same series. It differs from plates of similar size in the gizzard in presenting no angles, its base being oval in outline. To the right and left of the aperture is a pair of prominent pad-like structures with much-folded mucous membrane. The meeting of the two pads and the anterior plate effectually closes the aperture of the hepatic duct.

The pylorus is constricted by a weak sphincter-muscle. The character of the mucous membrane does not change at the pylorus, but appears to be the same in the upper part of the intestine as in the stomach. The long intestine traverses the length of the liver three times, beside coiling around it, and making a double loop over the surface of the hermaphrodite gland (fig. 12, Plate III). Within 15 millimeters of the anus, a sudden change occurs in the nature of the mucous membrane, which there becomes thicker and is thrown into from 10 to 12 longitudinal folds. Each fold corresponds to one of the points on the edge of the anal papilla. The rectum occupies the center of the anal papilla; around it is a considerable thickness of gauzy connective tissue, crossed by numerous radiating fibers connecting the rectum and the dermis.

The liver needs no particular description. It forms a solid, well-defined mass, without division into distinct lobes. The intestine is so closely attached to the liver in most places that it can not be dissected away without rupture. The life-color of the liver is gray with black markings, but after preservation in formalin the liver assumes the usual dark-green color.

The hepatic ducts form three main ducts, one anterior and two posterior, which open into a short but broad common duct (fig. 21, Plate IV). The latter receives a few small ducts which are independent of the three larger ducts already mentioned. The common hepatic duct opens into the stomach by the aperture previously described.

The right stomatogastric nerve (fig. 21, Plate IV) passes to the dorsal side of the œsophagus, while the left remains ventral. Near the posterior end of the crop these nerves divide into branches which make a ring around the crop and anterior end of the gizzard, and also give off three nerves which pass over the surface of the gizzard, one on the dorsal, one on the ventral, and one on the left side. At the anterior end and near the middle of the stomach these three nerves anastomose in two rings which encircle the stomach. From the second ring, the left and ventral branches proceed to the pylorus, where another ring is formed. From this point, nerves pass along the walls of the intestine, but can not be readily followed. No noticeable enlargements or ganglia occur at the points of anastomosis.

VASCULAR SYSTEM.

The auricle (fig. 31, Plate V) is large (23 millimeters wide, 9 millimeters long, 7 millimeters deep), its base being expanded so that it covers the base of the gill and extends upon the anterior face of the kidney. The reno-pericardial pore is found beneath this part of the auricle. The wall of the auricle is transparent and extremely delicate. Its interior is crossed by numerous anastomosing muscular fibers, which can be seen through the wall. The auricle receives blood through several large openings from the efferent branchial vein, as well as by one or more openings from the kidney. The ventricle (fig. 31, Plate V) is conical (14 millimeters long by 11 millimeters wide), the base being turned toward the auricle, with thick but spongy walls. The auricle is attached to the ventricle over practically the entire basal surface. The auriculo-ventricular aperture is a wide horizontal slit, 6 millimeters long. Each lip of the slit is turned into the ventricle and forms an efficient semilunar valve, 4 millimeters high (fig. 32, Plate V).

The pointed anterior end of the ventricle joins a bulbous aorta of considerable size, a large appendage of which projects upon the right side. Four large arteries spring from the aortic bulb, the intestinal, gastric, and genital arteries, and the aorta.

The gastric artery (fig. 30, Plate V, 22) quickly divides into two branches which follow the junction of crop and gizzard, one on the dorsal and left sides, the other on the right and ventral surfaces. Each gives off branches to both gizzard and crop. The right branch sends a large vessel to the œsophagus. The aorta (fig. 30, Plate V, 5) passes forward and downward over the left side of the viscera until it reaches a position beneath the posterior extremity of the pharynx. Here, a large vessel is sent forward beneath the pharynx until the anterior portion of this is reached, where the vessel enters the pharynx. This vessel sends a small branch from its right side to the pleuropedal ganglion; from the left side a larger branch supplies the ventral and dorsal walls of the head and the cerebral ganglia; a ventral branch passes into the foot.

In one specimen dissected, a large branch arose from each side of the base of the pharyngeal artery (fig. 30, Plate V), at the point where it passes beneath the pedal ganglia. The right branch entered the sheath of the right side of the nerve ring, the left one the left side. The diameter of each branch being fully half that of the pharyngeal artery, it may be seen that the central nervous system is richly supplied with blood.

The aorta then turns backward along the left side of the foot, sending first a large branch into the middle portion of the foot, then passing into the tissues at the junction of foot and lateral body wall back of the middle of the body.

The intestinal artery (fig. 30, Plate V, 19) arises from the posterior part of the aortic bulb, passes immediately into the liver, and then follows closely the second, posteriorly-directed loop of the intestine. One large branch passes through the anterior part of the liver to the part of the intestine just back of the gizzard (fig. 30, Plate V, 23); other branches pass into the substance of the liver; numerous short branches are given off to the intestinal walls. The genital artery (fig. 30, Plate V, 12) gives off, first, a branch which furnishes a rich supply of blood to the terminal part of the sperm-oviduct and to the neighboring body wall, and a branch to the osphradium. The main vessel passes downward, following closely the medial side of the genital duct; it then divides, one part passing above the duct to the right side of the albumen gland, the other branch passing to the ventral side of the genital mass, giving off a branch to the hermaphrodite duct, a large vessel to the posterior and right sides of the albumen gland, another vessel to the anterior part of this gland, and a vessel to the central mucous gland.

The principal vein of the body lies under the left margin of the nephridium and pericardium, occupying the entire width of the space which separates the lateral extension of the true mantle-cavity beneath the nephridium and pericardium, from the body wall of the left side of the visceral mass. Numerous apertures in the ventral surface of this vein admit blood from the left side of the body. Other openings in the dorsal wall permit blood to pass from it into the kidney. At the base of the branchia, it receives a large vein from the right side of the visceral mass, and then enters the efferent branchial vein. The efferent branchial vein opens into the auricle by several large apertures. The venous sinuses of the nephridium, also, communicate directly with the auricle.

REPRODUCTIVE SYSTEM.

The principal portions of the reproductive system (fig. 23, Plate IV) form two large masses, often referred to in the literature of this group of mollusks as the anterior and posterior genital masses. The posterior mass consists entirely of the hermaphrodite gland, which lies back of the liver and forms the rounded posterior extremity of the visceral mass. The hermaphrodite gland, in reality, is an elongated organ, but is rolled spirally in such a manner as to form an approximately hemispherical mass, the flattened surface of which is applied against the liver. The coils of the intestine which enfold the gland follow its inrolled edges. The convoluted hermaphrodite duct arises from near the center of the anterior surface of the gland, and passing toward the right side connects with the ventral surface of the anterior genital mass (fig. 22, Plate IV). The anterior genital mass is composed of a central mucous (nidamental) gland, surrounded by the coils of the oviduct (fig. 22, Plate IV). Upon its ventral surface is the spermatocyst. The hermaphrodite duct passes forward under the anterior genital mass till it reaches the neck of the spermatocyst. The last coil of the oviduct is continuous with the sperm-oviduct which passes forward from the right side of the mass (text figure 5). The spermatocyst opens into the smaller spermatic division of the sperm-oviduct. At the base of the spermatocyst, the hermaphrodite duct changes its character, becoming much smaller and losing its convolutions. This narrow portion of the duct passes almost completely around the neck of the spermatocyst, until directly posterior to it (fig. 22, Plate IV). Here, the hermaphrodite duct divides into two portions, sperm duct and oviduct. The sperm duct turns sharply forward, crosses the neck of the spermatocyst, and finally enters the latter upon its anterior surface close to the junction of the spermatocyst with the sperm-oviduct (text figure 5). The oviduct passes dorsad over the posterior surface of the neck of the mucous gland and leads directly into the convoluted tube seen on the dorsal side of the anterior genital mass (fig. 23, Plate IV). This can then be traced into the broad white coils which form the structure commonly called the albumen gland, which as a matter of fact is no more than a specialized portion of the oviduct. The albuminogenous portion of the oviduct is flattened transversely, the lumen being a horizontal slit which extends almost completely across the tube. The wall of the outer edge of the duct remains thin, forming a well-marked conducting channel. The dorsal and ventral walls of the glandular part of the duct are produced internally into thin, closely packed, transverse lamellæ, to which the considerable apparent thickness of these walls is due. The proximal end of the albuminogenous portion of the oviduct is thin-walled and differs conspicuously from the remaining portions by the racemose condition of its wall. The wall of this part, moreover, is quite thin and bears no internal lamellæ. The oviduct finally opens into the right, or oviducal, side of the sperm-oviduct (text figure 5).

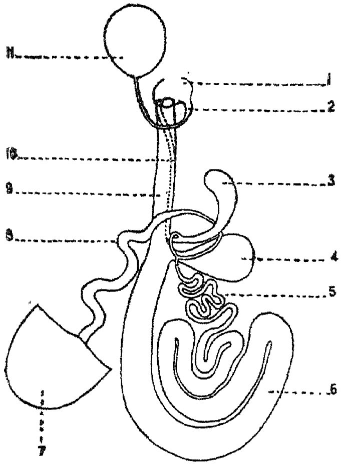


FIG. 5.—Diagram of the reproductive system of *Aclesia freeri* sp. nov. 1, vulva; 2, copulatory recess; 3, spermatocyst; 4, mucous gland (nidamental gland); 5, proximal portion of oviduct; 6, albuminogenous portion of oviduct (albumen gland); 7, hermaphrodite gland; 8, hermaphrodite duct; 9, ovarian portion of sperm-oviduct; 10, spermatic portion of sperm-oviduct; 11, spermatheca.

The mucous (nidamental) gland is visible only on the ventral surface of the anterior genital mass. It is a brown body, roughly triangular in outline, occupying the central part of the mass (fig. 22, Plate IV). Its walls are thinner, but considerably firmer and stronger, than those of the albumen gland. The internal cavity of the gland is large; it is partially divided into an anterior and a posterior chamber by an inward projection of the dorsal wall. The internal surfaces of the walls are folded into low lamellæ, which are approximately parallel to the axis of the gland. The broad, short neck of the gland opens by a large aperture into the ovarian side of the sperm-oviduct, just back of the junction of the spermatocyst with the spermatic duct (text figure 5).

The spermatocyst is a club-shaped sack, the narrow neck of which is a direct continuation of the spermatic portion of the sperm-oviduct (fig. 22, Plate IV; text figure 5).

The common genital duct (sperm-oviduct) is divided into two parallel tubes by a pair of longitudinal, internal folds arising from the walls, whose edges are closely appressed. The oviducal portion is thicker-walled than the spermatic, the walls being evidently glandular. Near the vulva, the sperm-oviduct is twisted spirally. Two or more complete turns are made; the spermatic portion of the duct thus comes to open into the vulva upon the left side of the ovarian. There is a single genital opening into the vulva, but the spermatic and ovarian apertures are practically separated by the median septa previously mentioned. The seminal furrow enters the spermatic duct, and can be traced along its wall nearly to the proximal end.

The globular spermatheca (Vesicle of Swammerdam) lies in front and to the left of the genital aperture (fig. 23, Plate IV). Its slender duct passes backward and along the left side of the vulva, crosses over the sperm-oviduct to the right side, and turning forward enters a small diverticulum of the vulva upon the right side.

The penial aperture is found immediately under the right tentacle. When the penis is indrawn, it lies in its sheath at the right side of the pharynx. There is no prostate gland connected with the organ. When extended the penis has the form of a cylinder about 5 millimeters in diameter by from 14 to 18 millimeters long, terminating in a flattened expansion, the prepuce (figs. 24 and 25, Plate IV). The cylindrical base is pigmented like the surrounding skin; the prepuce is white. The main flattened portion of the prepuce is about 9 by 7 millimeters in dimensions, nonmuscular, and apparently capable of being considerably distended by vascularization. The distal surface is slightly convex, and is marked by fine parallel ridges. The anterior angle is produced into a sharp, slightly spiral point, from 4 to 6 millimeters in length, over which are scattered small backwardly directed spines. Upon reaching the base of the penis, the seminal furrow passes distally upon the anterior surface of the cylindrical base of the organ and then follows a somewhat spiral course to the tip of the prepuce.

A shelf-like lamella springing from the right side of the seminal furrow, which meets the overhanging margin of the left side of the furrow, practically forms a closed tube along the bottom of the seminal furrow for the passage of sperm from the genital oriface to the copulatory organ.

NERVOUS SYSTEM.

The circumœsophageal ring formed by the central nervous system is large and but loosely attached to the œsophagus. It is enveloped by an extremely fine, cottony form of connective tissue; the connective tissue unites those nerves which pass most directly from the cerebral, pleural, and pedal ganglia to the body wall, and thus a small space surrounding the pharynx is almost completely separated from the large body hæmocœl. The various ganglia are large, but not all distinct without careful dissection because of their close fusion. Ganglia and nerves are covered by thick connective-tissue sheaths. The cerebral ganglia (fig. 33, Plate VI) are fused into a single mass which shows no median constriction or other sign of its double origin. The optic and rhinophoral nerves arise from its dorsal surface; nerves to the other parts of the head spring from the anterior margin. The cerebro-pleural and cerebro-pedal connectives are either separated by a slit, or are so loosely united by connective tissue that they can be easily distinguished. The pleural and pedal ganglia of each side are closely fused. The pedal commissure is large, and a narrow parapedal commissure is also present upon the posterior face of the pedal commissure; these two may be separated by a narrow space toward the right side. The visceral and parietal ganglia are closely fused to each other and to the right pleural ganglion, but are connected to the left pleural ganglion by a long and fairly thick pleuro-visceral connective. The cerebro-buccal connectives arise from the sides of the cerebral ganglia, just in front of the roots of the cerebro-pedal connectives. They make an unusually wide loop around the sides of the œsophagus and join the sides of the buccal ganglia instead of the posterior surfaces, as is more commonly the case. The buccal ganglia are comparatively large. They give origin to the stomatogastric nerves, as well as to those which pass to the muscles of the buccal mass and to the salivary glands.

Each rhinophoral nerve ends in a small ganglion, lying at the base of the inrolled, sensory surface of the rhinophore, from which a number of fine nerves pass to all parts of the sensory epithelium. There is no apparent tentacular ganglion, the tentacular nerve ending in a network of fine branches under the inrolled surface of the tentacle. The nerve of the oral lobe ends similarly. Several nerves spring from each pleural ganglion and pass to the lateral and dorsal walls of the anterior half of the body. A large nerve from each pedal ganglion passes backward from along the junction of the foot and wall of the body to the end of the tail. Branches pass from it to the parapodia and the posterior half of the foot. Other nerves, arising from the pedal ganglia, innervate the parapodia (fig. 33, Plate VI, 14 and 15) and the anterior half of the foot (37). A small, much-branched nerve passes from the right pedal ganglion to the penis, its muscles, and the body wall in its immediate neighborhood.

A large genital nerve extends from the visceral ganglion to a small genital ganglion. From it some small nerves enter the integument around the vulva, while the principal nerve runs along the sperm-oviduct until it reaches the point where the hermaphrodite duct crosses the oviduct, traversing several small ganglia on the way. At this point is a larger ganglion from which the principal nerves of the albumen and hermaphrodite glands arise.

A much smaller nerve which arises from the left side of the visceral ganglion (fig. 33, Plate VI, 23) runs, without any branches, along the right side of the body to the rectum, where it enters a small rectal ganglion; from this a nerve passes along the rectum toward the intestine. A third nerve, also very fine, arises from the right side of the visceral ganglion (fig. 33, Plate VI, 26), and runs directly backward; this was traced to the duct of the spermatheca and to the pericardial wall. The parietal ganglion gives rise to a single, large nerve which passes to the osphradial ganglion (fig. 33, Plate VI, 27); the branchial nerve arises from this and passes into the base of the gill.

In life, the individual ganglia or groups of nerve cells are vivid orange in color, and a better idea of their arrangement can be obtained in fresh than in preserved specimens. The color is contained in the gigantic nerve-cells of the centers, some of which are large enough to be visible to the naked eye.

The cerebral ganglion consists of a single triangular mass of nerve-cells, the apex of the triangle being dorsal. The angles of the mass are formed by the principal collections of cells (each of which is a group of loosely aggregated cell masses), while the central portion of the ganglion is less dense. Each buccal ganglion consists of one large, and a dozen or more smaller, cell masses, each quite separate from the others. The broad but short buccal commissure contains no nerve-cells. Each pleural ganglion consists of one large, and several small, cell masses.

Each of the visceral and parietal ganglia contains several cell masses, while similar groups of cells are scattered along the entire length of the left pleuro-visceral connective; therefore, there is a continuous series of ganglionic masses connecting the left pleural and the visceral ganglia.

The pedal ganglia are each composed of more than a dozen small cell masses. While these extend into the pedal commissure, the central part of the latter remains free from them. The pleural commissure contains no nerve-cell masses. The cell masses of the pedal and pleural ganglia are plainly separated.

ILLUSTRATIONS.

PLATE I.

(All drawings on this plate are natural size.)

FIG. 1. *Aclesia freeri* sp. nov.
2. Tentacle of *Aclesia freeri* sp. nov. with large villi.
3. Tentacle of *Aclesia freeri* sp. nov.
4. Large villus of body fully extended.

FIGS. 5 and 6. Villi.

FIG. 7. Rhinophore, showing the posterior grooved surface. (Drawn by Espinosa.)

PLATE II.

FIG. 8. Branchial cavity opened by splitting and folding back the parapodia.
9. Posterior extremity of an expanded, creeping aclesia. (Drawn by Espinosa.)

PLATE III.

FIG. 10. Ventral view of head.
11. Tentacle.
12. Digestive organs of *Aclesia freeri* sp. nov. The liver is drawn as if it were a transparent substance through which the coils of the intestine can be seen. The intestinal artery is seen entering the liver above the right margin of the stomach. The hermaphrodite gland lies back of the liver, surrounded by coils of the intestine.
13. Pharynx, œsophagus, crop, gizzard, and stomach, opened by a dorsal incision.
14. A portion of the wall of the stomach containing the hepatic pore, showing how the aperture is closed by the fleshy lateral pads and the anterior chitinous plate.
15. Lateral view of the pharynx. Only the anterior end of the pharynx is attached to the lips. The left salivary gland lies upon the dorsal surface of the œsophagus; the right some distance below. The buccal ganglia show behind the right salivary gland.
16. Anterior view of the interior of the gizzard.
17. Basal view of a large stomach plate. The axial column is clearly defined. × 2.
18. Lateral view of the same plate. × 2.
19. Lateral view of one of the small plates situated on the anterior margin of the gizzard. × 4.
20. A small spine from the stomach. × 4.5. (Drawn by Espinosa.)

PLATE IV.

FIG. 21. Outline of œsophagus, crop-gizzard, stomach, and hepatic ducts, showing the course of the stomatogastric nerves. × 1.5.

22. The ventral surface of the anterior genital mass. Natural size.
23. The reproductive organs lying in their natural positions. The anterior genital mass lies upon the surface of the liver. Natural size.
24. Outline of the right side of the head of an *Aclesia freeri* sp. nov. showing the everted penis. Natural size.
25. The dorsal surface of the prepuce. × 4.
26. A tentacle having an unusual development of villi.
27. Lateral view of the radula. × 4.
28. Dorsal view of the radula. × 4.
29. Ventral view of the radula. × 4. (Drawn by Espinosa.)

PLATE V.

FIG. 30. Arterial system of *Aclesia freeri* sp. nov.

1, pharyngeal artery.
2, artery of pleuro-pedal ganglion.
3, artery of median portion of foot.
4, artery of right body wall and parapodia.
5, aorta.
6, arteries entering wall of spermatheca.
7, artery of body wall in the region of the seminal furrow.
8, artery of sperm-oviduct and left side of vulva.
9, artery of sperm-oviduct and vulva.
10, artery of sperm-oviduct.
11, osphradial artery.
12, genital artery.
13, artery of hermaphrodite duct.
14, artery of oviduct (albumen gland.)
15, artery of mucous (nidamental) gland.
16, artery of right side of albumen gland.
17, artery of ventral surface of albumen gland.
18 and 19, intestinal artery.
20, hepatic branch.
21 and 23, deep hepatic branches.
22, gastric artery.
24, artery of left side of foot, left body wall, and parapodium.
25, artery of foot.
26 and 27, artery passing along dorsal side of crop and œsophagus.
28, branch to dorsal wall of head.
29, branch to ventral wall of head.

31. The auricle and ventricle in the pericardium. Natural size.
32. The base of the ventricle, to show the large auriculo-ventricular valves, and the arrangement of muscles in the wall of the ventricle. The wall of the auricle is spread out around the base of the ventricle. × 4. (Drawn by Griffin and Espinosa.)

PLATE VI.

FIG. 33. Nervous system of *Aclesia freeri*. sp. nov.

1, nerves to central and inner parts of the pharynx.
2 and 3, nerves to lateral surface of pharynx.
4, nerve to external circular muscle of pharynx.
5, nerve to posterior and ventral surface of pharynx.
6, nerve to lips and anterior part of head.
7, nerve to salivary gland.
8, penial nerve, supplying penis, retractor penis, and the body wall in the vicinity.
9, 10, 11, 12, 14, and 15, nerves passing to body wall, parapodia, and lateral part of foot.
13, the index line is directed to the point where a nerve (24) to the central portion of the foot emerges from beneath the pleural ganglion. Its origin is from the ventral surface of the pedal ganglion.
16, principal pedal nerve.
17, genital ganglion.
18, nerve to sperm-oviduct.
19, small ganglion on ventral surface of sperm oviduct.
20, continuation of trunk of genital nerve.
21, ganglion situated on the rectum, about 7 millimeters from the anus.
22, intestinal nerve.
23, nerve arising from visceral ganglion, which passes to the rectal (anal) ganglion.
24, pedal nerve to central portion of foot.
25, corresponding nerve of left side.
26, nerve traced to spermatheca and pericardial wall.
27, osphradial ganglion.
28, branchial nerve.
29, ganglion situated beside the spermatocyst.
30, ganglion situated at the crossing of the hermaphrodite duct and the oviduct.
30′, nerve to oviduct (albumen gland).
30″, nerve following the hermaphrodite duct to the hermaphrodite gland.
31, nerve to region around the mouth.
32, nerve to oral lobe. The branch on the other side of the fork passes to the integument of the anterior part of the head, dorsal to the mouth.
33, tentacular nerve.
34, main trunk of nerve passing to the oral region.
35, stomatogastric nerve.
36, rhinophoral nerve, ending in ganglion from which numerous fine nerves arise.
37, nerves to anterior portion of foot.
38 and 39, nerves to left body wall and parapodia.
40, left pedal nerve.
cr. b. c, cerebro-buccal connective.
cr. gn, cerebral ganglion.
p. gn. R, right pedal ganglion.

p. c, pedal commissure.

par. gn, parietal ganglion. The right pleural ganglion lies between the pedal and parietal ganglia, closely joined to the latter.

v. gn, visceral ganglion.

p. p. c, para-pedal commissure.

pl. gn. L, left pleural ganglion.

p. gn. L, left pedal ganglion.

cr. pl. c, left cerebro-pleural connective.

cr. p. c, left cerebro-pedal connective.

b. gn, buccal ganglia.

34. Ventral view of pedal, pleural, parietal, and visceral ganglia.

35. Central nervous system of a specimen of *Aclesia freeri* sp. nov. in which the viscero-parietal ganglion is some distance back of the œsophageal nerve ring, approaching the condition found in *Tethys* (*Aplysia*).

c, cerebral ganglion.

p, left pedal ganglion.

p', right pedal ganglion.

pl, left pleural ganglion.

pl', right pleural ganglion.

p. par, pleuro-parietal connective.

pl. v, pleuro-visceral connective.

V. par, viscero-parietal ganglion.

36. Right lateral view of cerebral, pedal, pleural, and parietal ganglia.

(Drawn by Griffin.)

TEXT FIGURES.

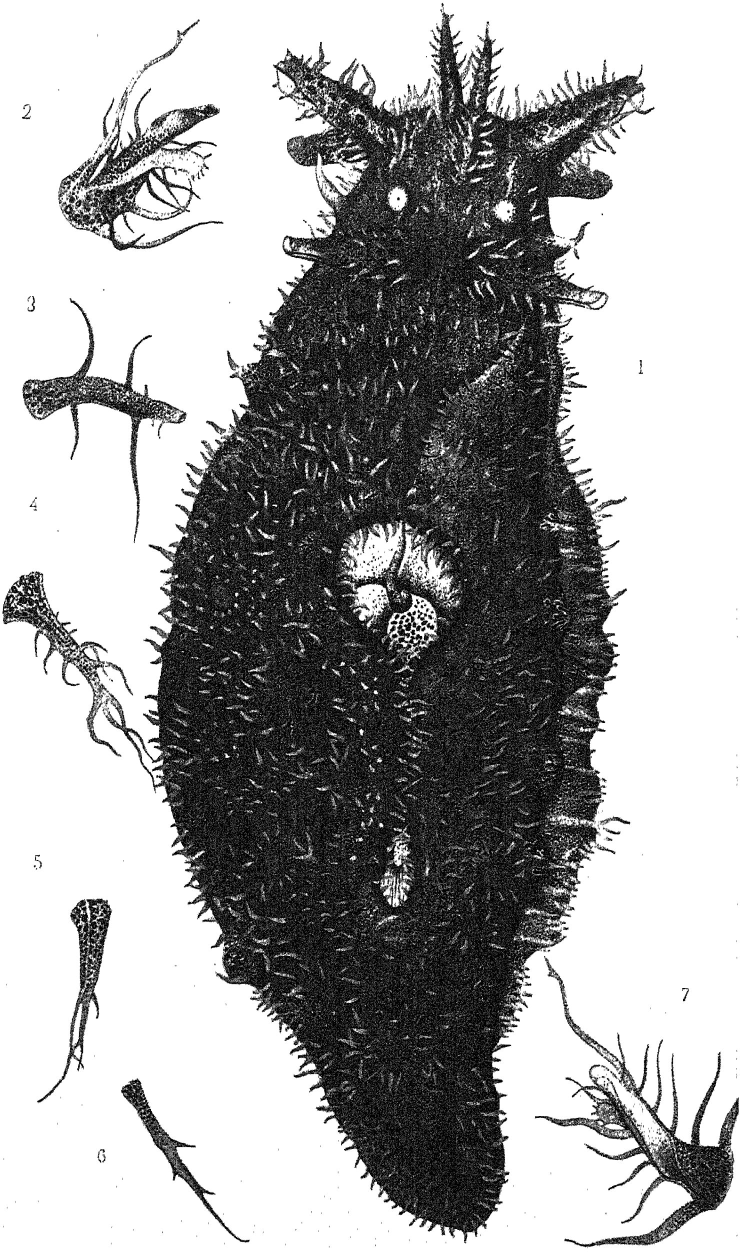
FIG. 1. Diagram of the pallial complex of *Aclesia freeri* sp. nov. *A*, anal papilla; *bv*, afferent branchial vein; *mr*, mantle ridge, *i. e.*, the projecting free margin of the reduced mantle; *n*, nephridium; *o*, osphradium; *par*, parapodium; *p. e.*, pericardium; *v*, vein of left side of body running beneath the pericardium and nephridium; *vu*, vulva; *x*, aperture by which the blood from the hæmocœl and veins of the right side of the body enters the branchial vein.

2. Outline of a mandibular plate of *Aclesia freeri* sp. nov. The figure within the outline, represents four of the rods of which the plate is composed. The concave border of the plate is anterior. Actual dimensions, 5 millimeters high, 3 millimeters wide at bottom, 1 millimeters wide at top.

3. Central tooth, first and second inner laterals, and four outer lateral teeth of the radula of *Aclesia freeri* sp. nov.

4. Cuticular spines or thorns upon the inner surface of the pharynx of *Aclesia freeri* n. sp. The four spines at the left are from the anterior, the ones to the right from the posterior region of the part of the pharynx thus armed.

5. Diagram of the reproductive system of *Aclesia freeri* sp. nov. 1, vulva; 2, copulatory recess; 3, spermatocyst; 4, mucous gland (nidamental gland); 5, proximal portion of oviduct; 6, albuminogenous portion of oviduct (albumen gland); 7, hermaphrodite gland; 8, hermaphrodite duct; 9, ovarian portion of sperm-oviduct; 10, spermatic portion of sperm-oviduct; 11, spermatheca.



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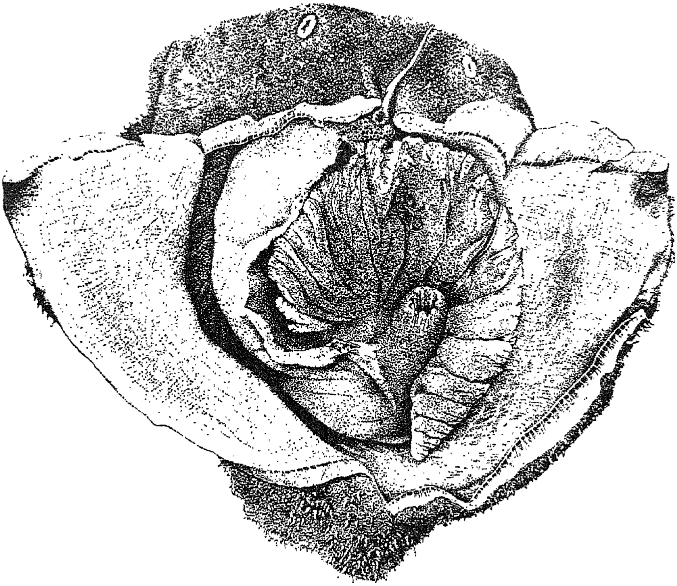

Fig. 8. Branchial cavity of aclesia.

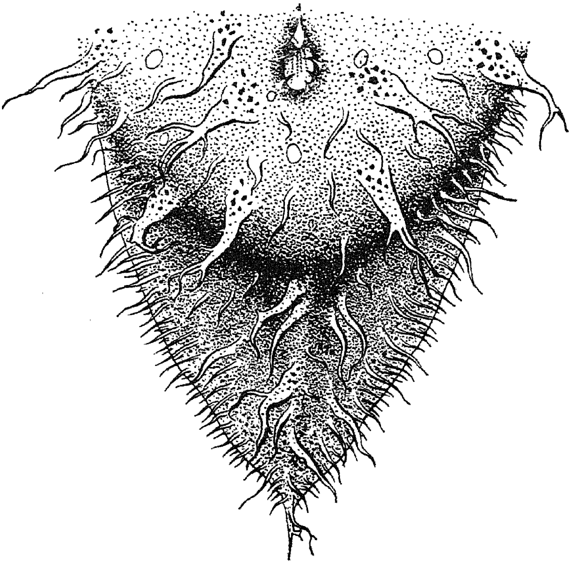

Fig. 9. Posterior extremity of Aclesia freeri sp. nov.

PLATE II.

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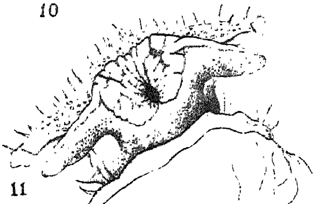

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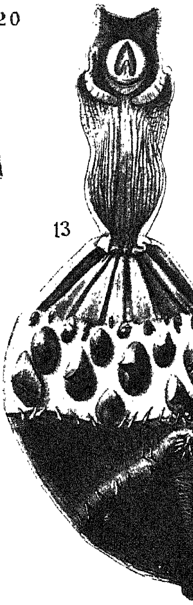

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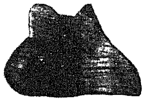

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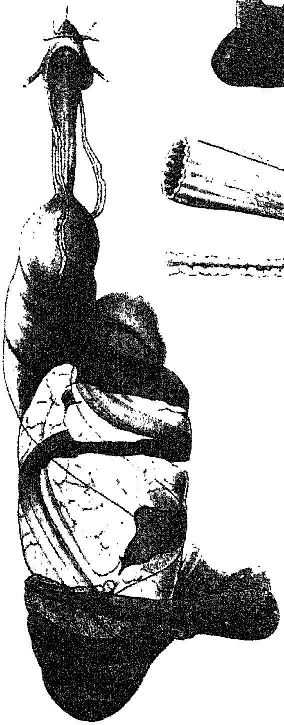

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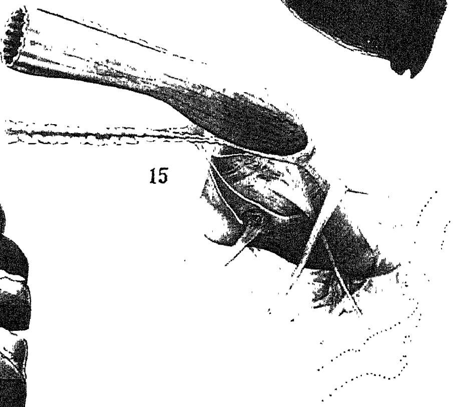

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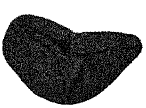

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PLATE III. ANATOMY OF ACLESIA FREERI sp. nov.

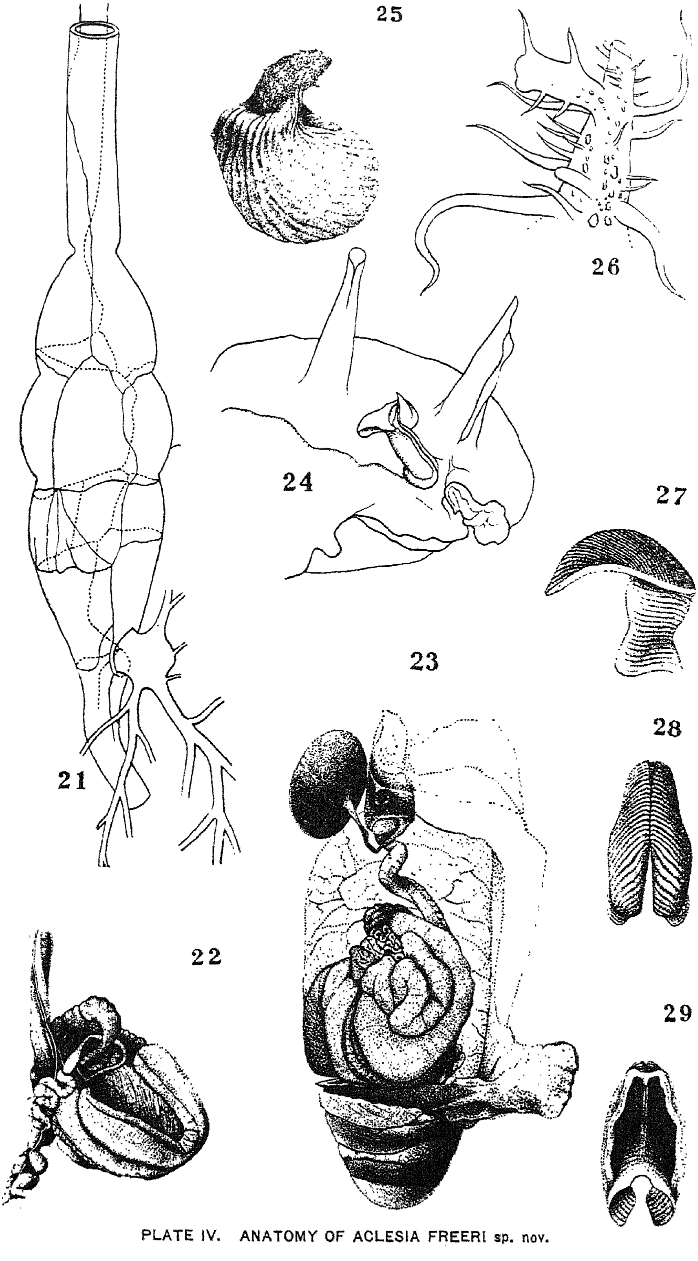

PLATE IV. ANATOMY OF ACLESIA FREERI sp. nov.

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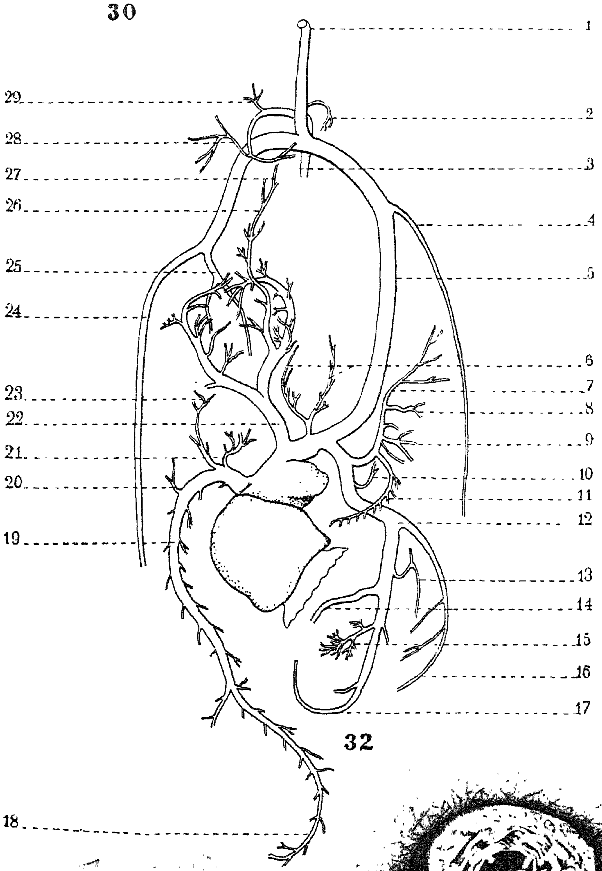

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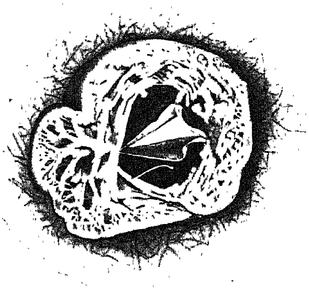

PLATE V. ARTERIAL SYSTEM OF ACLESIA FREERI sp. nov.

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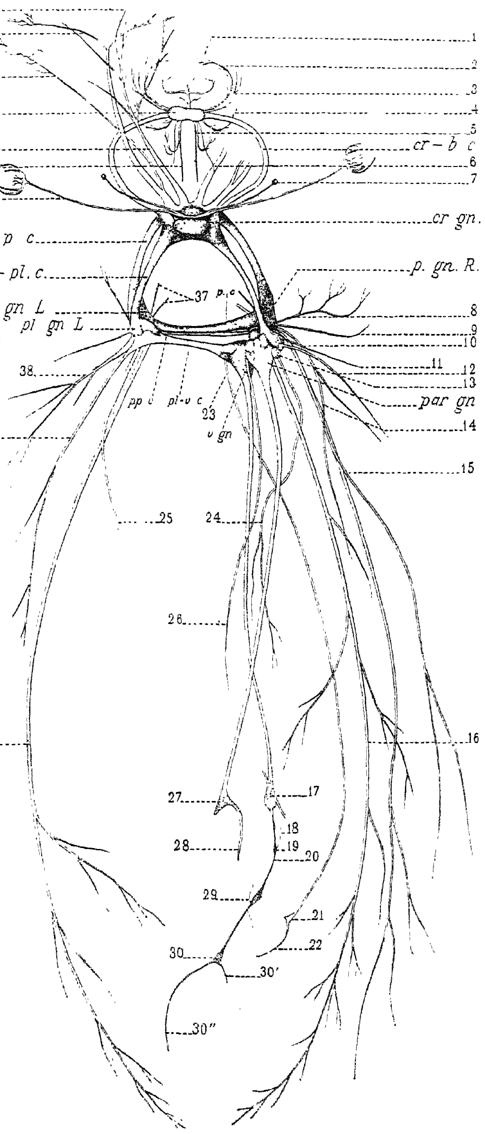

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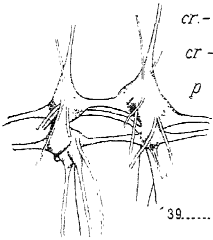

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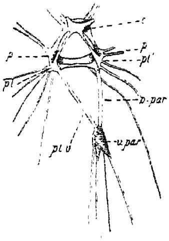

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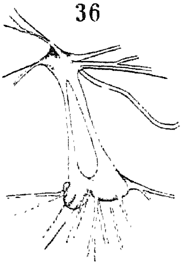

PLATE VI. NERVOUS SYSTEM OF ACLESIA FREERI sp. nov.

THE PHILIPPINE JOURNAL OF SCIENCE.
D. General Biology, Ethnology and Anthropology.
Vol. VII, No. 2, April, 1912.

A NEW PHILIPPINE FIDDLER-CRAB.

By A. S. PEARSE.

(*From the Zoölogical Laboratory, University of the Philippines.*)

The most abundant species of fiddler-crab along the *esteros* near Manila has not been described. Believing the species to be new, the writer prepared the following description while he was serving as assistant professor of zoölogy in the University of the Philippines.

Uca rathbunæ sp. nov.

Description.—Length of carapace about three-fifths its greatest breadth, which is at the acute antero-lateral angles. Carapace not very convex, smooth, anterior margin somewhat arcuate; the regions all recognizable, but not clearly defined; posterior border one-half the greatest breadth; lateral margins not converging posteriorly. The crenulate line that bounds the dorsal plane on each side is well marked two-thirds of the way back and convergent posteriorly. The breadth of the front, measured between the bases of the eye-stalks, is about one-twentieth the greatest breadth of the carapace. The front is spatulate, and its raised border is wider at the ventral margin than the central groove.

Orbits somewhat oblique; borders sinuous, both crenulate; crenulations on the lower border progressively larger away from median line; a line of fine crenulations below all the upper border except the outer quarter; a row of tubercles on the floor of the orbit inside the middle third of the lower border.

Larger cheliped of male with hand nearly 3 times greater than length of carapace; merus finely granulated on outer surface, all margins denticulate, denticles larger at superior distal angle; carpus granulated on upper and outer surfaces, hairy and denticulate on antero-internal margin. Hand with palm somewhat flattened, granulate, both borders well defined, upper border hairy on its compressed rounded posterior margin; oblique granulated ridges on inner surface of palm both well

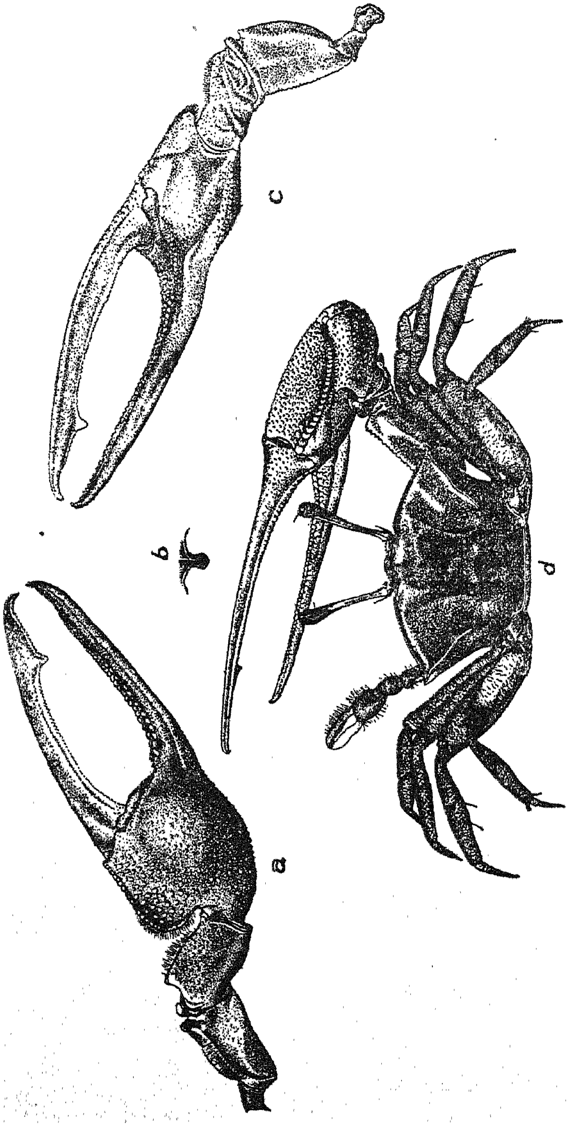

Fig. 1.—*Uca rathbunæ* sp. nov. × 1.5. *a*, Outer surface of cheliped of male; *b*, front; *c*, inner surface of cheliped of male; *d*, dorsal view of male.

defined, outer one most prominent, a well-marked elongated depression between them. Fingers rather slender, strongly flattened, minutely granular; both have a longitudinal groove on the external surface, but that in the fixed finger is the deeper; fixed finger tapering, nearly straight, hooked at the top, smooth on lower margin and denticulate on inner margin; movable finger slightly arcuate, bearing 2 strong spines on inner margin, one at the tip and the other about one-fourth of the length of the inner margin from it; most individuals also have a strong denticle on the inner margins of each of the fingers about one-third of the distance from the proximal end. Merus of last pair of legs somewhat foliaceous.

Color of living male.—Dorsal surface of carapace, dark brown (65)[1] (almost black) with a transverse yellowish-white (141) band back of the front and sometimes another spot of the same color in the center of the back; eye-stalks light brown (137). Large chela with fingers and inside of palm white, outside of palm whitish or green above (341) and fuscous (102) below. Other walking legs gray (222); back of merus of last pair of legs white; abdomen bluish (402).

The above description was taken from 69 males and 8 females, collected May 22, 1911, at an estuary three blocks south of the Philippine Medical School, Manila, P. I. The 10 largest males gave the following average measurements: Length of carapace, 14.64 mm; breadth of carapace, 24.40; length of chela 40.3. This species closely resembles *U. dussumieri* (Milne-Edwards),[2] but can be distinguished from it by the constant presence of a tooth on the inner margin of the movable finger near the tip, by the well-marked lines bounding lateral borders of the dorsal surface, and by the less salient character of the 2 oblique ridges on the inner surface of the palm.

Miss M. J. Rathbun has kindly compared two specimens of this species with specimens of 13 narrow-fronted species from the Indo-Pacific region in the United States National Museum. She reports that *U. rathbunæ* is most nearly related to *U. urvillei* (Milne-Edwards) and makes the following observations:

> Shape of carapace much as in *U. urvillei.* The orbital margin is a little more oblique. Frontal furrow longer, not triangular and sharp pointed at the extremity as in *urvillei,* but slightly spatulate. The accessory line of granules above the lower margin of the orbit is much shorter, occupying

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[1] The numbers following colors refer to Klincksieck, P., et Valette, T. Code des couleurs. Paris (1908).

[2] For references, see Alcock, *Jour. Asiat. Soc. Bengal* (1900), 69, 362.

less than one-third of the middle of the orbit, and composed of 4 or 5 granules (or on one side of one specimen it is broken into 8 smaller granules); in *urvillei* the line of granules occupies as much as one-half the length of the orbit. The granulation of wrist and hand is finer than in the related species and the granules on the lower edge of the palm are more prominent. The groove of the immovable finger is more deeply impressed at its origin. The fingers are narrower and less flattened; the immovable one has an enlarged tubercle near its middle, and the movable finger has two enlarged tubercles or small teeth, one near the middle and one not far from the tip. The merus joints of the ambulatory legs are not so wide as in *urvillei*, the difference being most noticeable in those of the last pair.

ILLUSTRATION.

TEXT FIGURE.

FIG. 1. *Uca rathbunæ* sp. nov. × 1.5.
a, outer surface of cheliped of male.
b, front.
c, inner surface of cheliped of male.
d, dorsal view of male.

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ZWEI NEUE LUCANIDEN DER PHILIPPINEN.

Von CARL FELSCHE.
(*Leipzig, Germany.*)

Prosopocoilus palawanicus sp. nov. (Tafel I, fig. 1.)

♂ Grösse und Statur des *P. buddha* Westw. Schwarz, Kopf matt, Halsschild mässig, Flügeldecken stark glänzend. Kopf fast quadratisch, der Clypeus rund, in der Mitte des Randes mit einem Knoten, die Fläche tief ausgehöhlt, der Stirnkiel bis zum äusseren Rande der Mandibeln reichend, einen nach rückwärts gerundeten mässig tiefen Bogen bildend, Stirn und Scheitel eine ebene, stumpf dreieckige, seitlich unbestimmt begrenzte Fläche bildend, die ganze Oberfläche fein und dicht gekörnt; die Augenkiele wenig hervortretend, das Auge kaum halb durchsetzend, der Seitenrand hinter den Augen etwas gerundet erweitert; die Lippe breit, vorn einen flachen, völlig gleichmässigen Bogen bildend, das Kinn dreieckig, die Unterseite des Kopfes, mit Ausnahme der Kehle welche weitläufig fein punktiert und glänzend ist, dicht und fein gekörnt; die Mandibeln sind etwas länger als Kopf und Halsschild zusammen; unmittelbar an der Basis haben sie einen breit dreieckigen, darüber, etwa am ersten Viertel, einen schlankeren Zahn, von diesem bis zum letzten Viertel sind sie breit, parallelseitig, ganz leicht geschwungen, der letzte Teil ist plötzlich stark verschmälert, sodass der vorhergehende am Ende zahnartig vortritt, der letzte Teil einwärts gebogen in eine starke Gabel endend. Thorax quer ziemlich gewölbt, der Vorderrand in der Mitte vorgezogen, der Hinterrand gerade, die Seitenränder parallel, und im letzten Drittel sehr leicht geschweift, die Vorderecken spitz, unmittelbar neben ihnen eine kleine Ausrandung, die ganze Fläche fein gekörnt, dazwischen sehr zerstreut eingestochene Punkte, die Mitte etwas glänzend. Flügeldecken schwarz, mit sehr schwachem Erzglanz, auf der Scheibe äusserst fein zerstreut punktiert, stark glänzend, die abfallenden Teile seitlich und hinten äusserst fein gerunzelt. Die Beine gleichen denen des *P. buddha*, nur fehlt den Mittelschienen der feine Dorn. Länge incl. der Mand., 49 mm.

PALAWAN, Iwahig, P. I. (*C. M. Weber*).

Typus ♂ in meiner Sammlung unter No. 11631, des Bureau of Science.

Aegus currani sp. nov. (Tafel I, fig. 2.)

♂ Von der Grösse der grössten *A. platyodon* Parry aber schlanker, von diesem wie den anderen mir bekannten *Aegus* durch den Frontalkiel verschieden. Kopf doppelt so breit als lang, parallelseitig; Kopfschild sehr kurz, steil abfallend etwas ausgehöhlt, am Vorderrand sehr leicht geschwungen, der Frontalkiel, welcher bis zur inneren Basis der Mandibeln reicht, ist vierzähnig, die beiden mittleren Zähne gross, mit breiter Basis, durch einen dreieckigen Ausschnitt getrennt, die äusseren kaum ein Viertel so gross; hinter diesem Kiel die Fläche des Kopfes in etwa in ein Viertel ihrer Länge leicht ansteigend, dann eben, dicht gekörnt, vorn und an den Seiten mit zerstreuten groben Punkten. Mandibeln so lang als Kopf und Halsschild zusammen, von der Basis an leicht nach aussen, im letzten Drittel ziemlich kräftig nach innen gebogen, die Bezahnung bei beiden gleich; nahe der Basis ein dreieckiger etwas nach unten gerichteter Zahn, darüber, noch etwas unter der Mitte, ein ähnlich grosser, dann, etwa in der Mitte, ein viel kleinerer und endlich im letzten Drittel, gleichmässig verteilt, noch fünf Zähnchen. Halsschild anderthalb mal so breit als lang, hinten und an den Seiten gerade, vorn, wie gewöhnlich geschweift, die hinteren Winkel breit gerundet, die vorderen vorgezogen aber schräg nach innen abgestutzt; die Fläche dicht gekörnt, in der Mitte eine schwache Längsfurche, auf der Fläche einzelne grobe Punkte, besonders in der Furche, an allen Rändern besondere grosse Punkte, die so dicht stehen, dass die Sculptur netzartig erscheint. Flügeldecken jede mit sechs ziemlich tiefen Streifen, die im Grunde kettenartig punktiert sind, die Zwischenräume ziemlich gewölbt fein punktiert, der neben der Naht auf seiner inneren Hälfte ziemlich grob und fein, alle an der Basis sehr grob runzelig punktiert; diese Sculptur erstreckt sich auf dem sechsten Zwischenraum bis ziemlich zur Mitte und tritt auch mehr oder weniger auf die angrenzenden Streifen über; der abfallende Teil der Flügeldecken ist mässig grob, aber sehr dicht punktiert. Die Vorderschienen wie gewöhnlich gezähnt, der vorderste Zahn einfach, die mittleren Schienen mit zwei, die hinteren mit einem Zahn. Länge incl. der Mand., 55 mm.

LUZON, La Laguna, Santa Maria, P. I., (*H. M. Curran*).

Typus ♂ in meiner Sammlung unter No. 12721, des Bureau of Science.

ILLUSTRATIONEN.

TAFEL I.

(Ad nat. del J. Castro.)

FIG. 1. *Prosopocoilus palawanicus* sp. nov.
2. *Aegus currani* sp. nov.

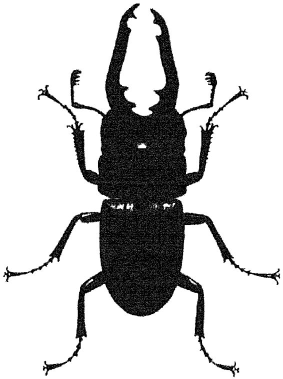

Fig. 1. Prosopocoilus palawanicus sp. nov.

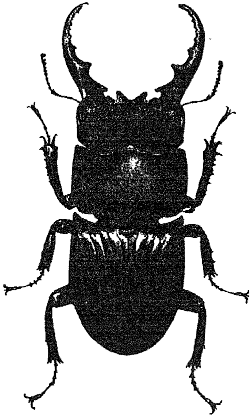

Fig. 2. Aegus currani sp. nov.

TAFEL I.

THE PHILIPPINE JOURNAL OF SCIENCE.
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Vol. VII, No. 2, April, 1912.

EIN NEUES APION VON DEN PHILIPPINEN.

Von HANS WAGNER.
(*Dahlem, Berlin, Germany.*)

Apion (Pseudopiezotrachelus) schultzei sp. nov. (Fig. 1.)

Dem *Apion* (*Pseudopiezotrachelus*) *unicolor* Roel. ungemein nahe stehend, durch folgende Punkte von ihm verschieden. Der Rüssel ist in beiden Geschlechtern etwas weniger gekrümmt, beim ♂ wenn auch schwach, so doch deutlich von der Fühlerinsertion zur Spitze verjüngt, beim ♀ kaum schwächer als beim ♂ (bei *unicolor* ♀ fast glatt und ziemlich stark glänzend) sculptiert; der Thorax ist um geringes länger, dessen apicale Einschnürung merklich kräftiger, die Seiten des apicalen Teiles (vor der Einschnürung) erscheinen mehr winkelig und der Vorderrand ist in der Mitte deutlich eingebuchtet; die Punktierung ist etwas gröber und namentlich dichter; die Flügeldecken erscheinen infolge der etwas geringeren seitlichen Rundung ein wenig gestreckter; ihre Zwischenräume sind etwas stärker chagriniert und dazwischen von feinen Querrunzelchen durchzogen. In allen übrigen Punkten stimmt die Art mit *unicolor* völlig überein. Die Art lag mir in 8 völlig übereinstimmenden Exemplaren (♂ ♂ und ♀ ♀) von folgenden Localitäten zur Beschreibung vor:

Länge, incl. Rüssel, 3 mm.

LUZON, Batan, Lamao (*H. E. Stevens*).

Typus, ♂ und ♀ No. 9841 in der Sammlung des Bureau of Science, Manila, P. I.

LUZON, Pampanga, Mt. Arayat (*W. Williamson*).

Cotypen, No. 2986; 4 Exemplare, davon 2 Exemplare mir freundlichst überlassen.

In dem Material, welches mir von Herrn W. Schultze in Manila, dem die vorstehende Art freundlichst dediciert sei, mitgeteilt wurde, befanden sich noch 4 Exemplare des *Apion versutum* Faust, die sich—nach Vergleich mit der Type—nur durch etwas helleres Braun des ganzen Körpers und durch die helleren, mehr rötlichgelbbraunen Beine von der typischen Form unterscheiden; sämmtliche Exemplare stammen von Manila, Luzon (*C. S. Banks* No. 5275; und *B. Arce,* No. 6150), ein Belegexemplar wurde gleichfalls freundlichst meiner Collection überlassen.

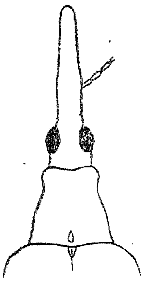

FIG. 1.—Kopf und Thorax von *Apion schultzei* sp. nov.

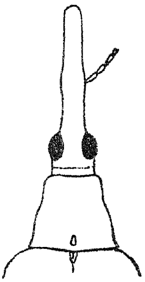

FIG. 2.—Kopf und Thorax von *Apion unicolor* Roel.

Der leichteren Orientierung wegen habe ich es für gut befunden die Characterisierung der vorstehenden neuen Art mit einer mittels des Abbé'schen Zeichenapparates angefertigten Skizze der in Betracht kommenden Körperteile zu vervollständigen und habe zum Vergleich dazu auch eine solche über *Apion* (*Pseudopiezotrachelus*) *unicolor* Roel. (Fig. 2) beigegeben; beide Abbildungen beziehen sich auf das männliche Geschlecht der betreffenden Species.

ILLUSTRATIONEN.

TEXTFIGUREN.

FIG. 1. Kopf und Thorax von *Apion schultzei* sp. nov. ×20.
2. Kopf und Thorax von *Apion unicolor* Roel. ×20.

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EINE NEUE GATTUNG DER DISCOLOMIDAE (COLEOPTERA) AUS DER ORIENTALISCHEN REGION.

Von K. M. HELLER.

(*Kgl. Zoologisches und Anthropologisch–Ethnographisches Museum, Dresden, Germany.*)

Nachdem D. Sharp[1] gezeigt hat, dass die kugeligen kleinen Hinterhüften seiner Discolominen-Subfamilie nur die sichtbaren Enden von in Wirklichkeit sehr breiten, aber vom Metasternum und von der ersten Bauchschiene verdeckten queren Hüften sind, macht es Hugh Scott[2] sehr wahrscheinlich, dass auch die Gattungen *Aphanocephalus* und *Fallia* zu den bereits von Horn[3] als Familie vorgeschlagenen Discolomidae gehören, was E. Csiki[4] als bereits erwiesen annimmt und dementsprechend 8 Discolomiden Gattungen aufführt, darunter auch *Aphanocephalus*. Letztere war bisher die einzige Gattung der Familie, die ausser in der neotropischen auch in der orientalischen Region verbreitet ist. Es ist daher eine überraschende Tatsache, dass mir durch die Sammlung des Bureau of Science in Manila noch eine weitere, neue Gattung, die jedoch eine nähere Verwandtschaft mit *Holophygus* als mit *Aphanocephalus* aufweist, bekannt geworden ist und weiter unten ausführlicher beschrieben werden kann; sie lässt sich nach den zumeist nur den Diagnosen entnommenen Gattungsmerkmalen der Discolomidae (mit Ausnahme von *Coccidophilus*) wie folgt in einer tabellarischen Übersicht der Gattungen einreihen:

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[1] Biol. Centr. Americana, Coleop. (1899), 2, pt. 1, 497.

[2] Fauna Hawaiensis (1908), 3, pt. 5, 432.

[3] *Proc. Am. Phil. Soc.* (1878), 17, 556.

[4] Coleopterorum Catalogus. Berlin (1910), pars 18, 31.

- *A^1*. Tarsen viergliedrig, Körper länger als breit, 9.–11. Fühlerglied eine lose gegliederte Keule bildend.
  Discogenia Kolbe. Ostafrika.
- A^2. Tarsen dreigliedrig.
  - *B^1*. Seitenrand der Decken nicht, oder wenn abgesetzt, dann weder wellenförmig noch mit einer Reihe entfernter Knötchen.
    - *C^1*. Fühlergeissel neungliedrig, Körper fast kreisrund oder kurz elliptisch, Flügeldecken ohne abgesetzten Seitenrand.
      Discoloma Er. Central- und Südamerika.
    - *C^2*. Fühlergeissel 7–8 gliedrig, Körper gestreckt, elliptisch, Hinterhüften weit voneinander getrennt.
      - *X^1*. Keule ungegliedert, 4. und 5. Geisselglied an Länge wenig verschieden (die 3 letzten Geisselglieder zusammen viel länger als das vierte Geisselglied). Hinterhüften klein, kugelig.
        Fallia Sharp. Hawai, Central Amerika.
      - *X^2*. Keule zweigliedrig, 4. und 5. Geisselglied an Länge sehr verschieden (die 3 letzten Geisselglieder zusammen nur so lang wie das vierte). Hinterhüften quer bis an die Hinterbrustepisternen reichend.
        Coccidophilus Brèthes. Argentinien.
    - *C^3*. Fühlergeissel achtgliedrig, Körper fast kreisrund, Flügeldeckenseitenrand schmal abgesetzt, Halsschild an der Wurzel am breitesten, Geissel relative dünn (Keule ungefähr viermal so dick wie das letzte Geisselglied).
      Aphanocephalus Woll. Hinterindien, China, Japan, Brasilien.
  - *B^2*. Seitenrand der Decken breit abgesetzt, wellenförmig, mit einer Reihe von ungefähr sechs entfernten, knötchenartigen Anschwellungen.
    - D^1. Fühlergeissel achtgliedrig, Halsschild nahe der Mitte am breitesten, nach vorn mehr als nach hinten verengt, Fühlerkeule kurz keulenförmig, nur doppelt so breit wie das letzte Geisselglied, Schenkel gezähnt.
      Parmaschema gen. nov. Philippinen.
    - *D^2*. Fühlergeissel achtgliedrig, Halsschildseitenrand nicht wellenförmig.
      - *E^1*. Halsschild in der Mitte am breitesten, Fühlerkeule kurz keulenförmig.
        Notiophygus Gory. Südafrika.
      - *E^2*. Halsschild an der Wurzel am breitesten, Keule birnförmig, Hinterhüfte weit getrennt.
        Cassidoloma Kolbe. Ost und Westafrika.
    - *D^3*. Fühlergeissel neungliedrig, Halsschildseitenrand wellenförmig, Fühlerkeule gestreckt keulenförmig.
      Holophygus Sharp. Centralamerika.

Die neue Gattung sei wie folgt charakterisiert:

PARMASCHEMA gen. nov.

Genere *Holophygo* Sharp similis, sed antennae octoarticulatae, articulo ultimo breviter clavato haud articulato; prothorax transversus, lateribus fortiter rotundatis haud undulatis; femora ante apicem subter minute dentata; mesosternum inter coxas intermedias haud productum.

Typus: *Parmaschema nodimargo* sp. nov.

Köperform einer kleinen *Cassida* ähnlich. Geflügelt. Kopf mit querem, gewölbtem, von der Stirn durch eine gerade Naht getrenntem, am Vorderrand leicht ausgebuchtetem, Epistom. Lippentaster zweigliedrig (?), das vorletzte Glied aufgeblasen und gekrümmt, viel grösser als das konische letzte. Kiefertaster dreigliedrig, das zweite Glied quer, das dritte gestreckt kegelförmig. Fühler vor den vorstehenden Augen unter dem Seitenrand des Kopfes eingefügt, 8-gliedrig; das Endglied breit, keulenförmig angegliedert. Halsschild quer, am Hinterrande beiderseits leicht gebuchtet. Schildchen dreieckig, sehr klein. Flügeldecken breiter als das Halsschild mit flach ausgebreitetem Seitenrande. Hinterleib sechsringelig, erstes Bauchsternit so lang wie die beiden folgenden zusammen, mit kurzem zwischen die Hinterhüften hineinragendem Fortsatz. Alle Hüften scheinbar klein, kugelig und einander genähert. Tarsen dreigliedrig, das dritte Glied mindestens so lang wie die ersten zwei Glieder zusammengenommen.

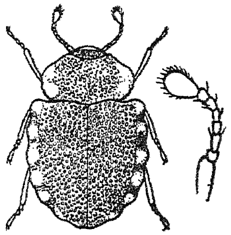

FIG. 1.—*Parmaschema nodimargo* gen. et sp. nov.

Parmaschema nodimargo sp. nov.

Badius, crebre punctatus, subtilissius parceque pilosus, elytrorum thoracisque margine pallidiore, subpellucido ac subtilius punctato, corpore subter, antennis pedibusque testaceis; prothorace transverso, margine laterali deplanato ac rotundato, maxima latitudine basi propiore, in dimidia parte basali crenulato, margine antico sinuato basi utrinque subsinuato; elytris margine basali utrinque intra humeros subsinuato, angulis humeralibus subrecte rotundatis ac extantibus, margine laterali expanso, undulato, nodulis sex glabriusculis remote seriatis apicem versus decrescentibus; metasterno segmentoque abdominali primo sat remote fortiterque punctatis, segmentis reliquis medium versus parcius punctatis; epipleuris in nodulis singulis obsoletis puncto majore.

Long. 1.8, lat. hum. 1.5 mm.

Patria: LUZON, Laguna, Lazaan (legit *Charles S. Banks*). Typus No. 11488 in Coll. Ent., Bureau of Science, Manila, P. I.

Kastanienbraun, überall sehr fein und sparsam behaart; Körperunterseite, Epistom, Fühler, Beine, der ausgebreitete Rand des Halsschildes und der Flügeldecken heller.

Epistom doppelt so breit wie lang, bräunlich gelb, etwas glänzend, fein und zerstreut punktiert, Stirn dunkler, relativ grob und dicht punktiert. Zweites Glied der Fühlergeissel fast kugelig, das dritte länger als eines der übrigen, Keule so lang wie die drei vorhergehenden Glieder zusammen, 1½ mal so lang wie breit. Halsschild doppelt so lang wie breit, der Seitenrand breit abgesetzt und flach, etwas durchscheinend und fein, die Halsschildscheibe gewölbt und grob punktiert, Basalrand beiderseits, der Vorderrand einfach ausgebuchtet, Seitenrand in der Basalhälfte stark gerundet und fein gezähnelt, in der Apicalhälfte kaum merklich concav verlaufend, in der Mitte der Ausschweifung mit zwei mikroskopisch kleinen Einkerbungen, Hinterecken sehr stumpf, Vorderecken rechtwinkelig verrundet. Flügeldecken so lang wie breit, Basal- und der wellenförmige Seitenrand in der Hauptrichtung rechtwinkelig aufeinanderstossend, ersterer vor den vorstehenden, abgerundeten Schulterecken etwas ausgebuchtet, mit Ausnahme des Seitenrandes grob und noch dichter als das Halsschild punktiert, jener mit einer Reihe von 6 nach hinten zu kleiner werdenden rundlichen, glänzenden, Schwielen, die grösser als die sie trennenden Zwischenräume sind; auf den breit umgeschlagenen Seitenrand (den Epipleuren) sind diese Schwielen wenig angedeutet und nur durch einen grösseren Porenpunkt markiert. Körperunterseite; namentlich die Hinterbrust und das erste Bauchsegment mässig dicht und kräftig, die übrigen Bauchsegmente nur an den Seiten deutlich punktiert. Äussere Kante an der Unterseite der Schenkel vor der Spitze in Form eines stumpfen kleinen Zahnes ausgezogen. Drittes Tarsenglied viel länger als die beiden Wurzelglieder zusammengenommen.

Die interessante Art wurde in fünf Exemplaren von Herrn Charles S. Banks, Government Entomologist in Manila, im mittleren Teil von Luzon, in Laguna, entdeckt.

ILLUSTRATIONEN.

TEXTFIGUREN.

FIG. 1. *Parmaschema nodimargo* gen. et sp. nov. 109

REVIEW.

Biology. General and Medical. By Joseph McFarland, M. D., with 160 illustrations. Pp. 440. Cloth. Philadelphia and London, W. B. Saunders Company, 1910.

Many teachers of biology should have welcomed the appearance of McFarland's book. It presents many subjects to which it has been difficult to introduce students without requiring them to read a large amount of extremely technical literature. It appears possible to use this book as a text in connection with laboratory work and lectures. If this is done the content of courses in general biology can be very considerably increased, and the student will come in contact with a much wider range of biological facts than is usually attempted in the so-called courses in general biology. The reading of this text, however, has emphasized the belief, which the reviewer has held for many years, namely, that courses in general biology should not be given to elementary students, but should follow one or more college courses in zoölogy and botany. To introduce students to phenomena of living substance through a course in general biology is fascinating in theory, but discouraging in practice. This text of McFarland, while evidently intended for use by students who have not had extensive scientific training, can scarcely be employed to advantage by those who have not had thorough preliminary courses in zoölogy and botany.

The scope of the work is wide, touching in its 18 chapters on such subjects as "Cosmical Relations of Living Matter," "the Origin of Life," "Conformity to Type," "Blood Relationship," "Parasitism," "Infection and Immunity," etc. It is significant of the increasing requirements of medical education, that medical students should be expected to have such a general knowledge of biological facts and theories as is outlined in this book. While there are chapters which will not meet with the full approval of zoölogists, still they may well read it carefully for the sake of seeing many things in their own field from a new point of view. The résumé of the theory of spontaneous generation is usually clear and good. The chapter on Manifestations of Life includes a discussion of the responses of animals and plants to various stimuli which is for the most part correct and clear. It might have been better to have made more manifest the distinction between nerve force and electricity. The paragraph in which distinction between motion and locomotion is set forth, while not important in itself, is one which illustrates the author's faculty of clear and illuminating expression. The section on metabolism is very good, especially its treatment of "foods" and the integration of living substance. It is unfortunate that in a book of this general character, cell division has not been treated in a broader manner.

The chapter on the higher organisms is probably the one most open to criticism by zoölogists. However, it should be remembered that a discussion of animal morphology, limited to 60 pages, is more difficult to write than a text-book of several times that length. The chapter on parasitism will be found extremely useful, and, if properly used in conjunction with laboratory work, should give the student a thorough grasp of this difficult but fascinating subject. The discussion of blood relationship is not as extensive as one would expect to find, but is sufficient if properly supplemented by the teacher. The chapter on infection and immunity affords a discussion of this subject which should go far to prepare students who are expecting to study medicine to understand this work in bacteriology and pathology, and give the work in bacteriology more biological meaning than is frequently the case. The text is not one which can be used to advantage, with even a fairly advanced class, unless the teacher is prepared to supplement it very largely with both lectures and experimental work and with additional readings; but, if used in the right way, it should prove a distinct advance on the texts in general biology which are now available.

LAWRENCE E. GRIFFIN.

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THE HABITS OF FIDDLER-CRABS.

By A. S. PEARSE.[1]
(From the Zoölogical Laboratory, University of the Philippines.)

The habits of fiddler-crabs are of particular interest to naturalists. Since the time of Darwin ('74), these crustaceans have been believed to furnish evidence of sexual selection on account of the bright coloration and enormous chela of the male; these characteristics contrasting strongly with the comparatively dull dress and the small bilaterally symmetrical chelipeds of the female. Alcock ('92, '00, '02) is convinced that ('00, p. 351)—

> In one species, at any rate (*Gelasimus annulipes*), the males, which are greatly in excess of the females, use the big and beautifully colored cheliped not only for fighting with each other, but also for "calling" the females.

According to the same writer ('92), Milne-Edwards described a South American species in which the male and female lived together in a single burrow, the former closing the mouth of the burrow with his large chela. But Smith and Weldon are apparently not convinced that the purpose of the peculiar adaptations of male fiddlers has been demonstrated, for they say ('09)—

> Though the genus Gelasimus is remarkable for the large size of one of its chelae the purpose of this peculiar adaptation is unknown in the various species.

They state that the chela is believed by various writers to be used for closing the burrow, as a weapon in combats, and as a means of attracting the female, but do not affirm that any of these uses have been demonstrated.

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[1] Recently assistant professor of zoölogy, University of the Philippines.

During the summer of 1911, the writer worked among the tropical fiddler-crabs that swarmed in the estuaries near Manila and on the mud flats along Manila Bay. In some places these little animals covered the beach in countless numbers. At low tide their bright colors and active movements made them conspicuous objects that could not fail to attract attention. Five species and 1 subspecies occurred in this locality, 5 of them being abundant. In order of decreasing numbers those represented were: *Uca forcipata* (Adams & White?, de Haan),[2] *U. marionis* Desm. and *U. rathbunæ* Pearse,[2] *U. marionis nitida* (Dana), *U. annulipes* (Latr.), and *U. gimardi* (Milne-Edwards). The behavior of all of these species was similar. The observations described in the following pages were undertaken with the purpose of discovering: (1) the habits and relationships of the various fiddler-crabs inhabiting the estuaries of Manila Bay and (2) the use or uses of the peculiar adaptations of the males. They were made between May 1 and August 1 at the estuary extending from Pasay to Georgia Avenue in the City of Manila. This narrow, shallow *estero,* as such places are termed in the Philippines, is about 3 kilometers long and is bordered by native nipa-palm houses along a large part of its extent.

GENERAL HABITS.

The fiddlers of Manila Bay are diurnal. On bright days, moreover, many more individuals are seen outside their burrows than when it is cloudy, provided the mud be somewhat wet. In order to ascertain whether they were active at night, the writer went to a place at the edge of an *estero* where he had been making observations in day-light for about a week, and where the ground was thoroughly familiar to him. On this particular evening, June 16, the sky was overcast with clouds, but though rain threatened, the darkness was relieved somewhat by occasional flashes of lightning and by the dim glow from the electric lights of Manila. The writer stumbled to his station at 8.15 and sat quietly on the grass for fifteen minutes. Then he flashed the light from an acetylene bicycle-lamp suddenly over the most populous part of the *estero.* Not a fiddler was to be seen. The light was shaded while five hundred seconds were counted, and again flashed over the *estero.* No crabs were in sight, but a good-sized snake was just entering a burrow about 1 meter away. The lack of fiddlers on this occasion was probably not due to the inclement weather for these animals often fed serenely in great numbers during the day in the midst of violent rainstorms. Furthermore, as fiddlers are often active on moonlight nights, the conclusion seems to be warranted that a certain amount of light is necessary to bring them from their burrows. The observations of Holmes ('08) support this view since he found that *Uca pugnax* was strongly positively phototropic when tested under laboratory conditions.

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[2] The writer's thanks are due Miss Mary J. Rathbun who examined these species. Acknowledgment is also due to Mr. Tom Jones, of the St. Louis University School of Medicine, who drew the figures appearing with this paper.

At Manila the burrows of the genus *Uca* are found for the most part between low- and high-tide marks on the mud flats. Many of them are so high that they are covered only at the time of very high tides, and their openings therefore may not be inundated for a number of days at a time. It would seem, then, that the location selected for a burrow is apparently not a matter of chance. The different species show a preference for certain levels, and this results in more or less clearly-marked zones on the shore of an *estero:* (1) High along the edge of the shore *Uca forcipata* is found, (2) this zone grades into the one of *U. rathbunæ* just below, while (3) *U. marionis* and *U. marionis nitida* are found in the softer mud of the deeper parts of the *estero*. The less abundant *U. annulipes* and *U. gimardi* were usually found in the second and third zones respectively. This stratification in habitats is very clearly shown (Table I) as the crabs emerge from their holes when the tide is falling.

TABLE I.—*Giving the number of each species of fiddler-crab observed in a certain area as the tide was receding.*

Date.	Time.	U. forcipata.	U. rathbunæ.	U. marionis and U. marionis nitida	U. annulipes.
	p. m.				
June 16	2.50	0	0	0	0
	3.00	2	0	0	0
	3.13	8	0	0	0
	3.35	22	8	0	0
	3.45	27	4	0	0
	4.05	31	10	0	0
	4.32	82	12	2	1
June 18	2.00	0	0	0	0
	3.15	2	0	0	0
	3.35	5	0	0	0
	3.51	11	1	0	0
	4.14	16	6	0	0
	5.12	70	14	1	1

It might be assumed that *U. forcipata* was the most abundant species in the locality chosen for these observations, but this was not the case. In order of decreasing abundance the species of this station were: *U. rathbunæ* (about 400 individuals), *U. forcipata* (275), *U. marionis nitida* (40), *U. marionis* (8), *U. annulipes* (3), *U. gimardi* (2).

In addition to their diurnal habits and discrimination in the selection of sites for their burrows, the fiddlers exhibited a third striking peculiarity in their reactions to tidal changes. Countless individuals were to be seen on the flats at low tide, and active feeding was carried on at such a time. The same was true when the sea was rising or falling. When the water threatened to cover the mouths of the burrows, however, a plug of mud was carried to the opening of each hole and drawn down after the owner in such a way as to shut him inside. During a period of high tides, burrows in low situations often remained closed for several days; during low tides, those on higher ground might be left open day after day, though the flats dried out to such an extent that the crabs could not feed easily, and mostly remained at the bottoms of their burrows.

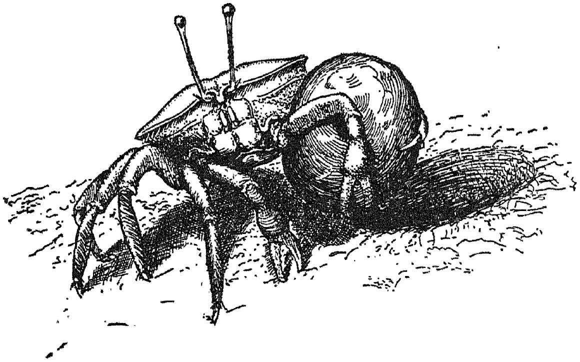

FIG. 1.—*Uca rathbunæ* carrying a load from her burrow. Drawn from a photograph.

BURROWING HABITS.

In excavating her burrow, a female fiddler digs with the walking legs of either side. After a piece of mud has been pried loose by working under it with the legs it is carried to the mouth of the burrow and deposited outside. The males usually enter their burrows with the small cheliped ahead; and hence they usually carry loads of mud hugged close against the body by means of the first three legs on the side opposite the large chela.

During the summer, however, 3 males were seen to hold a ball of mud with the two walking legs just behind the large chela, and on one occasion a male carried 3 successive loads in this manner. The males do not use the large chela for burrowing. As has been stated, females dig and carry from the burrow with the first three legs of either side, there being no difference between the legs. In either sex an animal bearing a load walks on the two posterior legs of the loaded side and the four walking legs of the opposite side. The burden is always below the animal as it emerges from the burrow.

The successive loads of mud are often carried as much as two-thirds of a meter from the mouth of the burrow; usually, however, to a distance of 25 to 30 centimeters; sometimes they are not carried away at all and may even be built in around the mouth of the hole. At times, all the excavated material is carried to a certain spot at a distance from the mouth of the burrow; the writer has seen from 40 to 50 loads thus placed in a neat pile. Some individuals scatter mud over a space of 1 to 2 meters, two loads seldom being put in the same place. One individual had 2 dump piles and he varied his labor by carrying a few loads to one, and then a few to the other. The mud brought from the burrow is often spread out flat and searched over for food with the small chela. The rapidity with which dirt is removed from a burrow varies to a considerable degree; a certain individual may bring only one load in a forenoon, while others may work as fast as possible for an hour or more. Different fiddlers were seen to excavate as follows: 6 loads in twenty minutes, 16 in twenty-one, 6 in six, 26 in twenty-five, 5 in three, 11 in five and one-half; or, these individuals averaged one load every 3.3, 1.3, 1.0, 1.0, 0.6, and 0.5 minutes respectively.

As has been stated, the burrows are usually closed when the tide comes in. Often the mouth of a hole is prepared by bringing in a bit or two of dirt from outside or by carrying some mud from below; such masses are plastered around the mouth of the burrow and smoothed over to make the opening more nearly circular. When all is ready the crab goes a little way off and secures a disk of stiff mud which he carries back to the hole and draws down after himself in such a way that the mouth of the burrow is neatly and completely closed (fig. 2). The "plug" is loosened from the floor of the estuary by pushing the walking legs beneath it, the crab "leaning back" to do so. The males always use the legs of the side opposite the big chela for this work, but the females employ those of either side. As it is carried to the burrow, the plug is held by the first three walking legs; the chela (always the small one in the male) is pressed down upon it from above while the second and third legs support it from below. After it has been drawn into the mouth of the burrow, it is usually adjusted from below for a few moments, and then its surface often meets that of the ground in such a way that it is difficult to discern. It was observed that when the mud was somewhat dry, fiddlers frequently went to the edge of the advancing tide to secure softer material, and in this showed some discrimination.

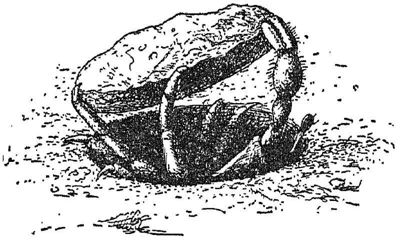

FIG. 2.—A fiddler-crab closing its burrow by pulling a disk of mud in after itself.

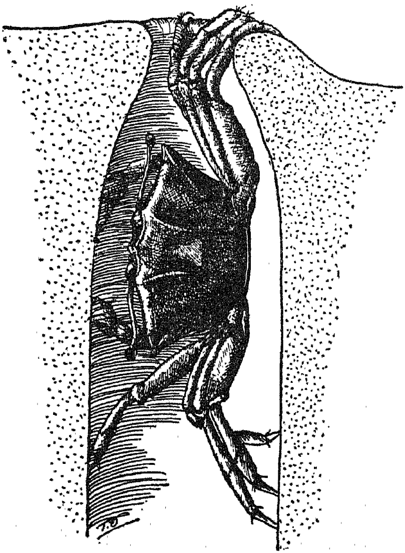

FIG. 3.—Showing an unusual method of closing a burrow.

Although the method just described was the usual one employed in closing burrows, fiddlers were twice seen to depart from it. Once a male pushed a mass of soft mud up ahead of him nearly to the top of his hole so that he shut himself inside. On another occasion a nervous little female, after hastily carrying 3 loads of dirt from her burrow and plastering a couple of pieces of soft mud around her doorway, went part way into her burrow, and by scraping with the legs of one side (fig. 3) gradually decreased the size of the opening until there was barely room enough to draw her legs inside. She then shut herself in by pushing up soft mud from below.

When a fiddler wishes to open a burrow that has been sealed, it pulls the plug down inside. The plug must usually be left there for it was seldom brought out within a reasonable time in the numerous instances observed. Once a large *Uca forcipata* was seen to open his burrow by simply walking out of it, the plug being pushed to one side.

Fiddlers are very cleanly in their habits and often scrape themselves with the small chelæ or with the walking legs when, in burrowing or in some other way, they have accumulated dirt on any part of their body. They are particularly careful of the eyes and eyestalks and these organs are often folded into their sockets and rubbed a few times. Mud or débris is not allowed to accumulate about the mouths of the burrows. Fiddlers have often been seen moving such matter to some little distance where it was cast aside or pushed down the holes of other crabs.

Both sexes move sideways in entering the burrow, and the males more often have the large chela uppermost as they disappear. So far as the writer observed they always emerge in the same position as they enter; that is, the body is not turned around in the burrow. The holes are usually of uniform diameter, though they may be slightly enlarged at the bottom and occasionally turn off in a horizontal direction. They vary in depth from about 16 to 75 centimeters, and usually have water standing in the deeper parts, even when the tide is out.

PLACE ASSOCIATION.

A fiddler usually does not wander more than a meter and a half from his home and is ever ready to dart into it at the slightest provocation. Nevertheless, the writer observed a few instances in which particular individuals wandered 4.2, 4.5, 9, 9, and 12 meters from their respective burrows and returned. One peculiarly marked *Uca marionis nitida*, for no apparent reason, dug a new hole 4.5 meters from where he had first been observed; and a certain *U. rathbunæ*, whose burrow had been inadvertently closed by the writer as he walked over it, dug a new hole 2.4 meters away; but such cases were unusual, and most crabs manifested a choice for a particular locality. On one occasion the writer was sitting motionless at the edge of the *estero* when a female fiddler came out of a burrow beside him. He quickly clapped a foot over the hole so that the owner could not enter. She sat perfectly motionless for fifteen minutes. Then, as the writer slowly moved away his foot, she made a dash to the spot where the burrow had been and tried persistantly to enter, but was not able to do so on account of the mud that had been pressed down in such a way as to close the hole. She remained thus until the writer frightened her away by bringing his hand near her.

A number of peculiarly marked fiddlers were snared with a noose of thread as they emerged from their burrows and then carried various distances to see if they would return. Although the results of these tests, as shown in Table II, were quite variable, they indicate that fiddlers have some power of association in connection with the situation they may have chosen for a burrow. Although only 3 out of 11 crabs returned to the same spot, the writer was convinced that the behavior of these 3 showed an association for a particular place.

TABLE II.—*Showing results of moving fiddler-crabs various distances from their holes.*

Number of individual.	Distance moved in meters.	Returned—	
		To same hole.	To same locality.
1	9.0	No	No.
2	6.0	No	No
3	4.5	No	No.
4	1.8	Yes	Yes.
5	6.0	Killed	Killed.
6	6.0	No	Yes.
7	5.4	No	No.
8	2.4	Yes	Yes.
9	6.0	No	No.
10	4.5	No	No.
11	2.4	No	No.

Numbers 1, 2, 3, 7, 10, and 11 were moved to new situations where high ground prevented them from seeing their burrows; 1, 2, 3, 5, and 11 were never seen after the day they were moved; 3, 6, 7, 9, and 10 at once occupied burrows in the new location, some of these dug new burrows and some may have occupied those already dug. Although number 1 was in plain view of the burrow where he had been captured, the writer could not see that he made any effort to return during the twenty-nine days he was watched. Number 8 dug a new burrow where he was placed and occupied it for two days; on the third day he had returned to his old haunts, but was not occupying his original burrow and had dug a new one 45 centimeters above it; on the fourth day he was often seen to enter his original hole, although he continued to excavate the one he had started the day before; from the fifth day he occupied the burrow he had started on the third and his original burrow was allowed to become filled with mud. Number 4 wandered about for some little time, frequently going to the tops of the little mounds of earth as if looking about. He did not move directly toward his burrow; in fact, he sometimes went in the opposite direction, but after about an hour he had returned to it. Number 7, an *Uca annulipes*, dug a burrow where he was placed and occupied it for twenty-two days; during this time his original burrow had become completely filled; on the twenty-third day he had returned to his original station and dug a new hole within 30 centimeters of his original home.

It was by no means easy for a strange fiddler to make his way among his fellows through a densely populated portion of the *estero*. Dangers beset him on every hand. Number 5, a good-sized *Uca rathbunæ*, was captured at 1.56 in the afternoon, and thrown 6 meters from his hole down a small bay. He was an unusually timid individual, dodging into one hole after another and investigating his surroundings from time to time from the tops of hillocks; at 2.59 when he had progressed 2 meters toward his own hole, he unfortunately entered the burrow of a male *Uca marionis nitida* and emerged in a few moments shorn of most of his legs; only the small chela remained on the left side and the second and fourth walking legs on the right side. He hobbled into a shallow burrow a little way up the bank. Next day his cleanly picked "bones" lay bleaching on the flat.

Of the 11 crabs moved to new situations, 5 were not seen again, 1 was known to be killed (others may have been), 3 dug burrows in new localities, and 3 returned to their original homes. Of the 3 that dug new burrows, 1 was behind a high grass-covered ridge, but in the other 2 instances the fiddler's view of his old habitat was unobstructed. Three crabs showed a strong homing propensity and the fact that this did not appear in 3 other cases may have been due to an inhibiting factor or factors, such as the danger of travel or the lack of acute vision in certain individuals. It is also possible that there may be individual differences in the ability or inclination to form place associations.

FEEDING AND FOOD.

Female fiddler-crabs feed by scooping up mud with the hairy, spoon-like fingers of the chelipeds and carrying it to the mouth; the two hands alternate rapidly in this action. The males, however, use only the small cheliped when feeding. These appendages are well suited for the work they have to do, for their fingers are flattened and hollowed in such a way that admirable dredges are formed for carrying mud to the mouth. Feeding is not attempted when the flats are dry, and it is most active just after the tide has gone out, or along the edge of an advancing tide. The mouth-parts sort over the mud that is brought to them and a mass of rejected material collects below them. This material slowly drips as the animal moves about feeding, and is frequently wiped away with a cheliped.

On July 4, 20 stomachs of *Uca rathbunæ* were collected between 8.55 and 9.20 in the morning. These were placed at once in 10 per cent formalin, and two days later the contents of 6 were examined microscopically with considerable care. The objects discovered were as follows, in the order of decreasing quantity: Plant tissue, a branched alga, vascular plant tissue, small green algæ, small brown spores or cysts (?), fine silt, diatoms, protozoa, and a piece of leaf epidermis. Striated muscle fibers were also found in 2 stomachs, but these may have been loosened from the stomach wall of the crab itself. Whether this was true or not, the examination showed that the food of fiddlers consists mostly of vegetable matter. The stomachs of 2 individuals were completely filled with a species of alga and a little fine silt. Probably a portion of the unidentifiable plant tissue consisted of the same alga, which appears to be an important element in the fiddlers' fare. Although these animals seem to take mud from almost any locality, they are not indiscriminate feeders, the chelipeds and mouth parts apparently exercising considerable care in the selection of food.

BEHAVIOR.

A fiddler-crab lives on the mud flats crowded among vast numbers of his fellows, but his intercourse with them shows no development of "social" instincts. He has selected his most suitable habitat, and the fact that he is surrounded by hundreds or thousands of his own kind is more or less incidental. Each fiddler searches the mud around his hole for food and his "hand is against every man." He is ever ready to dart into his burrow, and if danger threatens he quickly retreats into this refuge. If one of his fellows approaches too close to his domain, he rushes forth and enters into fierce combat. Each crab makes his hole the center from which all his activities are conducted, and he treats the approach of any intruder as an unfriendly act.

Though combats between 2 males are most frequent, males sometimes fight with females, and members of the weaker sex not infrequently struggle against each other. If 2 males that differ markedly in size fight, the larger combatant usually takes little interest in the contest and soon makes off, even though he may be hotly pursued by his smaller antagonist. When a small fiddler trespasses on a larger crab's territory, however, he is soon chased away. Males of different species frequently "cross swords," but the most sustained and spirited contests are between those of the same size and kind.

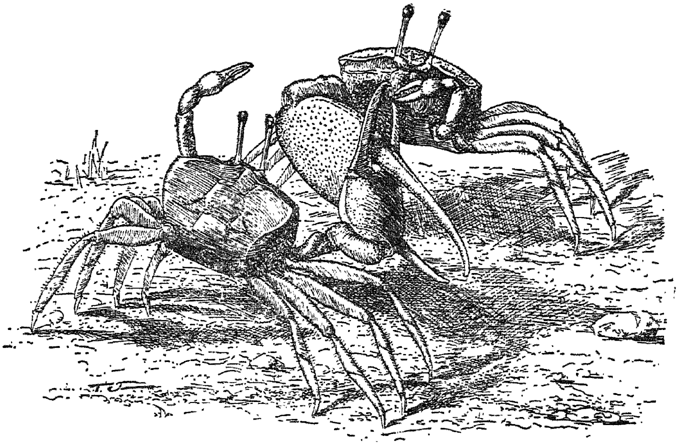

FIG. 4.—Position assumed by male fiddlers when fighting.

In fighting (fig. 4), the males face each other and often dance about excitedly, at the same time frantically waving the small chelæ. The large chelæ are then locked together, like two men shaking hands, and each contestant attempts to break off his opponent's claw by a sudden wrench. Such quick movements are often so violent that one of the fighters, rather than lose his claw, is obliged to loosen his hold and in so doing is thrown backward for a distance of from 60 to 90 centimeters. Although fights were frequent during the time the writer made observations, he saw only one crab dismembered (p. 121), and this individual did not survive the combat. In fighting, the large chela was not seen to be used as a club as Alcock ('92, p. 416) maintains, but often served as a shield to ward off a thrust. If a male got the worst of an encounter, he often retreated into his burrow and guarded it by extending his large chela from the opening (fig. 5). Sometimes one male caught another napping and entered his burrow. In such cases the owner waited nervously about until the intruder came out and then chased him away, or he boldly went down after the stranger with his large chela extended before him and usually emerged soon after followed by the intruder. Males were not infrequently seen standing at "attention" on some elevation (fig. 6), for as much as ten or fifteen minutes without moving. The writer was not able to determine the purpose of such actions. Perhaps these individuals were awaiting a mate, or an opportunity to fight.

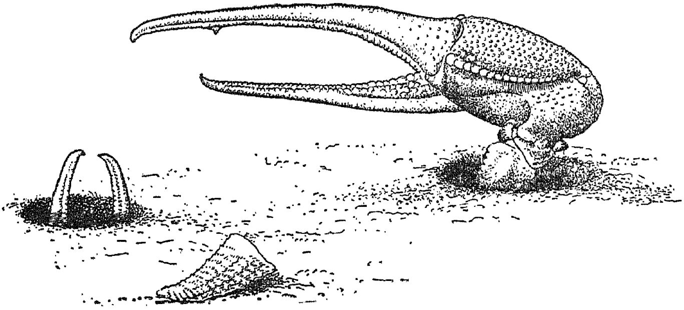

FIG. 5.—Fiddlers defending their burrows.

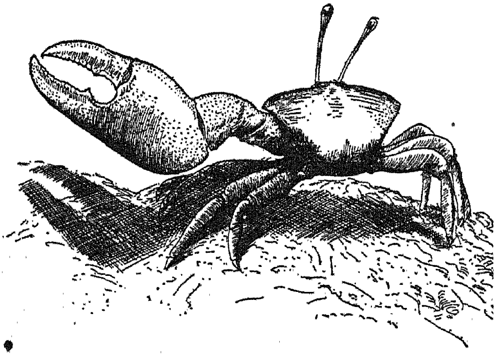

FIG. 6.—*Uca forcipata* standing at "attention." Drawn from a photograph.

There was a marked difference between the different species in regard to their relative pugnacity. *Uca annulipes* was the most active and excitable; *U. forcipata* was the most sluggish, though an excellent fighter when aroused. The fights between males and females were usually of short duration, and as a general thing were occasioned by one coming too near the burrow of the other. When the intruder was chased away the affair ended. In the combats between females, the contestants sometimes faced each other, but they usually stretched to their full height and danced about excitedly back to back and struck out behind with their walking legs.

Some of the activities of the fiddlers were like those displayed by higher animals while at play. The crabs frequently darted about apparently without a serious purpose, and were sometimes downright mischievous. On one occasion a male was half-heartedly pursuing a female. She went to her burrow, secured a plug near by, and shut herself in. The male then came directly to the burrow, seized the plug, and cast it to one side. The female was just emerging from the burrow when the writer ended the episode by frightening the participants by a sudden movement. Another time, two males (an *Uca marionis nitida* and an *U. forcipata*) of medium size were seen running about for perhaps half an hour over an area about 12 meters in diameter. They kept close together and acted like two mischievous sailors ashore. The tide was coming in rapidly, and in their rambles the pair came to a place where a large slow-moving *U. forcipata* was carrying a plug to close his burrow. They waited until the plug had been pulled down over the owner, then the *U. forcipata* went to the hole and removed it; and, as the outraged owner emerged, the plug-remover and his mate scuttled off toward the former's burrow some 4.5 meters away. He soon closed his own burrow, for the advancing water threatened to inundate it, and his companion hurried away down the *estero*. The writer watched him until he had gone more than 11 meters and was lost to view at the edge of the advancing water. To all appearances activities such as these just described were carried out in a spirit of sport.

Alcock ('00) believed that the males were "greatly in excess of the females," but this difference may have been assumed from only a casual observation. Some instances were noted by the writer in which the females outnumbered the males. For example, the counts shown in Table III represent the total number of fiddler-crabs to be seen along the edge of a small bay on the afternoon of May 20, as the tide was going out. Furthermore, even if the females to be seen were actually fewer than the males, it could not be taken as proof that they were less abundant; for, as they use both chelæ, they are able to feed twice as fast as the males; therefore, they could obtain the necessary food in a shorter time and would be able to pass longer periods sealed in their burrows. The crabs along the estuaries of Manila Bay, in the opinion of the writer, are about equally divided between the sexes. However, the males are more active and conspicuous and might easily impress an uncritical observer as exceeding the females in number.

TABLE III.—*Showing sexes of fiddler-crabs in view as the tide was going out.*

Time.	Females.	Males.
p. m.		
4.30	6	1
4.36	12	4
4.44	13	3
4.51	14	7
4.58	14	7
5.05	13	8

The behavior of the sexes toward each other is of particular interest. It was with deep regret that the writer was obliged to forego the pleasure of watching the fiddlers during the breeding season. Mating probably occurs at Manila "in the colder months," as Alcock ('92) has observed in India. No females were observed during the hot season (May 1 to August 1) that were carrying eggs or young, nor were any very immature fiddlers seen. The males frequently fought each other and stood at "attention" with outstretched chela on the top of some eminence (fig. 6), apparently awaiting a combat, but only a few cases of courting were observed.

The behavior of the sexes during courtship is important on account of its bearing on sexual selection. In one instance observed by the writer, the male waved his large chela and danced actively about the female with his back toward her for about five minutes. The female meanwhile hung around the mouth of her burrow, always keeping her face away from her suitor, while he made frequent attempts to climb over her backward. Although the male was unsuccessful in his efforts, he never turned his face toward the object of his attention. A movement by the writer frightened these lovers and they both ran into the female's hole. This was the only time that a male and a female were seen to enter the same burrow. On another occasion a female pursued by a male entered her burrow. Her suitor went halfway in after her, paused a moment as if feeling something within the hole, and then went away. The female came out of the hole and resumed her feeding. Another male was seen pursuing a female twice his size. In both the latter instances the male faced toward the female and approached her "head on" or sideways without any dancing; the females kept their backs toward the males. Still another case was observed in which a male danced actively about a female keeping his back constantly toward her; she was as unconcerned as possible and continued to feed through the whole performance.

The writer was interested to note that all males that were dancing about females kept their backs continually toward them. In such a position the bright coloration on the male's large chela was almost if not wholly invisible to the female. Furthermore, although many females are dull colored, the brightest tints are found on this sex; and though the chelæ of many males are brightly colored, the greatest range of striking reds, purples, blues, greens, and whites (as seen by the human eye) are found on the backs and legs of the females. All these facts throw doubt on the conclusions of Alcock ('92) who says (p. 416):

> I have been able to observe that, whatever other functions the great chela may serve—whether as a stopper to the mouth of the burrow, or as a nuptial support, as some have supposed—it also, in the species under consideration, is (1) a club used in the contests of rival males, and (2) a signal to charm and allure the females. This last function is particularly apparent. As one walks across the mud one first becomes aware of the presence of these crabs by noticing that the surface of the mud is everywhere alive with twinkling objects of a pearly pink colour. Carefully watched, these prove to be the enormous chelæ of a crowd of males of *Gelasimus*, waving in the air, each little crab standing at the mouth of its burrow and ceaselessly brandishing its big claw. On closer observation, among every ten or so males a small clawless female may be seen feeding in apparent unconcern. If the female should approach the burrow of a male, the latter displays the greatest excitement, raising itself on its hindmost legs, dancing and stamping and frantically waving its beautifully coloured claw. From prolonged watching I feel convinced that the waving of the claw by the male is a signal of entreaty to the female, and I think no one can doubt that the claw of the male has become conspicuous and beautiful in order to attract the female.

Alcock's observation could not have been very detailed for he "did not actually see the rival males seize each other in the conflict," and he could scarcely have failed to do this if any considerable amount of time had been spent. It would be easy for anyone observing the crabs in a casual way to believe that the males were trying to attract the females by their bright colors, but the writer saw nothing in the behavior of either sex that could be interpreted in that way. The males often wave their claws frantically, as Alcock says, but they apparently do this to an equal extent whether females are present or absent, and without any apparent reference to mating but often before fighting with another male.

Fiddlers treat other animals with suspicion. Any large moving object causes them to retreat at once to their burrows, although they soon emerge again if the object is not near at hand. Most crabs retreat into their holes when a man approaches within 15 meters, but if one is careful not to make any quick movements he can sit apparently unnoticed within a couple of yards of an active fiddler for hours at a time. Large adult crabs like *Sesarma bidens* are avoided, but small crustaceans of any species are at once attacked. Any strange animal, however small, is avoided; the writer once saw a small hermit-crab cause every fiddler near to run for its hole by moving quickly along the edge of the rising tide. The fiddler's burrow furnishes a retreat from many enemies, and his speedy reaction toward it in response to all movements in his field of vision would help protect him from the herons, snakes, skinks, frogs, toads, and fishes that commonly hunt along the shores of the estuaries.

In reacting to its surroundings, a fiddler-crab apparently uses its senses of sight and touch most, although the recognition of chemical substances may be important in securing and selecting food. The eyes are very quick to note any movement in the landscape; they are always held straight upward except when their stalks are being cleaned or when a crab is entering a burrow. Feeding probably depends mostly upon the tactile and chemical senses, for the usual position of the eyes is such that the small chelæ can not be seen as they pass food to the mouth. Such loud noises as whistling, hand clapping, gun shots, and locomotive whistles produced no apparent reaction from the fiddlers, nor did the stridulation of the large decapod, *Thalassina anomala* (Herbst), that builds its burrows among them.

GENERAL CONSIDERATIONS.

Although fiddler-crabs live together in enormous colonies, they show no coöperation with one another, nor do they manifest any tendency toward such communal existence as that displayed by some other arthropods; for example, ants, bees, wasps, and termites. In this they agree with other crustaceans, for although this class of animals exhibits an endless variety of structural adaptations suited to various habitats and modes of life, none of them has apparently taken advantage of the opportunities offered by a coöperative communal association among members of the same species (except in some instances in which the male is intimately associated with the female). Although the females of many species carry their eggs and newly hatched young for a time, the association of the young with their mother is nominal, for she never feeds nor cares for them. The struggle for existence is nowhere more apparent than in the midst of a fiddler-crab colony. Each individual jealously guards the area about his own burrow and immediately attacks any invader of this territory. His pugnacity is ever ready to show itself against his fellows that swarm about him and against numerous competitors of other kinds that also seek to eke out an existence from the area he has chosen for his own.

At Manila, the fiddler's chief competitors for the food on the mud flats are: (1) two species of *Macrophthalmus* whose feeding habits and food are very similar to those of the fiddler, but that usually live farther from the shore in the deeper parts of the estuaries and hence overlap the fiddler zone on the lower side only; (2) two burrowing crustaceans, *Sesarma bidens* De Haan and *Thalassina anomala* (Herbst), sometimes exceeding the fiddlers in size, that live mostly along the upper side of their zone; and (3) some smaller animals, such as the numerous mud snails, nereid worms, and the less frequent hermit-crabs. In addition to honest competition the fiddler must reckon with some larger animals that seek not his food but him. Among these the snakes, skinks, frogs, toads, and fishes are important.

The behavior of the fiddler is admirably suited to enable him to gain a livelihood and at the same time escape injury or death from his enemies. His aggressive attitude toward members of his own genus and toward other crabs of similar size keeps enough space clear about his burrow to enable him to sift his simple diet from the mud in comparative safety. Furthermore, the way is thus left clear for retreat to his burrow if danger threatens, and the fiddler is not slow in dodging into his hole as soon as any strange or threatening object moves within his field of vision. His burrow is the center of all his activities, and his association for the place where it is situated is very strong. Fiddlers are protected from night prowlers by their diurnal habits, and they escape the fishes and snakes that hunt at the edge of the advancing tide by closing the openings of their burrows when the water threatens to inundate them.

Although the majority of the reactions of fiddler-crabs are stereotyped and appear to be instinctive, yet they are open to some modification. The daily life of a fiddler is more or less of a routine—to dig a burrow, to seek food as long as the territory about his burrow is clear, to attack small aggressors, to retreat from large enemies, to plug the burrow when the tide comes in, to open it when the water recedes, to retire during darkness, and to mate at the proper season. These are his ordinary activities and they depend largely upon unvaried reactions. Some instincts are so strong that, although usually advantageous, they may be harmful; for example, place association and instinct to retire into her hole was strong enough to cause a crab to remain for some time in danger when the burrow could not be entered and she might have escaped by running away (p. 120). Nevertheless, a fiddler shows some ability to modify his reactions to suit circumstances; such as departing from his usual method of carrying mud from his burrow (p. 117), using different ways to plug the burrow (p. 118), and in some other activities.

A fiddler-crab is able to establish a place association for a certain locality, and to retain it for as long as three weeks (p. 121). Some activities (p. 125) might be interpreted as manifestations of a desire to play. The instinct to fight males of his own species and size is very strong in a fiddler, yet this instinct is more than a "fighting reflex," for he is slow to resent an attack by a smaller male (p. 123).

Concerning the structural differences between the sexes, it may be affirmed that the great chela of the male was not developed for burrowing or feeding, because he never uses it for either purpose; in fact, it is rather a disadvantage in either of these activities. The great chela closes the burrow inasmuch as it fills the opening as a weapon of offense (fig. 5), but is not used as a lid or stopper. It may be of some advantage in copulation, but this can not be affirmed until someone has actually seen the phenomenon. The great chela is of unquestionable use to the male in his combats with his fellows and in defending himself from other enemies. In this respect it is comparable to the secondary sexual characters of some other male animals, such as the stag's antlers, the cock's spurs, and the walrus's tusks. Among higher animals in which the males possess such special aggressive organs, however, the females are protected and cared for to some extent, but nothing of this sort is known among decapod crustaceans with secondary sexual adaptations (*Uca*, *Alpheus*, and others). Thus, although many of the crustacea have two adaptations which might fit them for colonial life—through the mother carrying her eggs and young for a time, thus having opportunity to start a colony with them; and through the aggressive adaptations of the males, which might enable stronger individuals of that sex to gather a number of females about them—their instincts have prevented them from developing it.

The writer can not believe with Alcock ('92) who thinks "no one can doubt that the claw of a male has become conspicuous and beautiful in order to attract the female" and that "it is used as a signal to charm and allure the females." In support of Alcock's views we have: (1) his own opinion, which, though apparently the result of more or less casual observations (p.127), is not to be taken lightly; (2) the conclusion of the writer from his observations at Manila that the colors of male fiddlers are perhaps most uniform on the great chela and more variable on other exposed parts of the body. Against Alcock's views may be urged: (1) that during the most ardent courtships observed by the writer (p. 127), the males kept their backs constantly toward the females so that the great chela could not be seen; (2) the chela is not always "bright" colored, at least as seen by the human eye, and the males that danced were not always bright; (3) other crustacea depend little if at all upon the sense of sight in choosing mates (Bethe, '97; Holmes '03; Pearse, '09; Chidester, '11), and there is some doubt as to the ability of crustaceans to discriminate colors (Pearse, '11); (4) at Manila the female fiddlers often were, to the human eye, more brightly colored than males of their own species, and the female's bright colors were on her back and legs so that they could readily be seen by a male dancing behind her but *she* did no dancing. The writer is convinced that the male dances about the female in order to induce her to mate with him, but, from his own observations, doubts whether the male's coloration is effective in influencing her to do so. The matter ought to be reëxamined during the active mating season with special reference to color. By observing the coloration of the males actually chosen, by painting the chelæ of rejected suitors, or by other tests, a definite conclusion could doubtless be reached. Until such experiments have been made it can not be affirmed that fiddler-crabs show the operation of sexual selection through color-discrimination.

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ILLUSTRATIONS.

TEXT FIGURES.

(From drawings by Tom Jones.)

FIG. 1. *Uca rathbunæ* carrying a load from her burrow. Drawn from a photograph.
2. A fiddler-crab closing its burrow by pulling a disk of mud in after itself.
3. Showing an unusual method of closing a burrow.
4. Position assumed by male fiddlers when fighting.
5. Fiddlers defending their burrows.
6. *Uca forcipata* standing at "attention." Drawn from a photograph.

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THE MANGYANS OF MINDORO.

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The Island of Mindoro lies directly south of Manila, distant only twelve hours by the usual steamship routes. Notwithstanding the facts that it is near Manila, that it has a varied topography, much cultivable land and valuable forests, it is one of the least known, least developed, and has one of the least dense populations of all the Philippine Islands. For some reason which Americans have never been able entirely to fathom, Mindoro had the reputation in Spanish times of being an unhealthful place. This to some extent may account for the tardy development and scant population which the island presents to-day.

The Christian people of Mindoro number about 45,000. They occupy a narrow coastal strip, extending with frequent interruptions around the entire island. By far the larger proportion of them are on the north and east coasts. They are almost entirely Tagalogs and Bisayas, the former in the northern part of the island and the latter in the southern. It is only along a few of the streams that the Christian people have made settlements in the interior, and these settlements are but a few miles inland. It does not appear to have been fear that has led the Christian Filipino to cling to the seashore, but simply the natural tendency of man to remain near the ocean until some necessity arises to urge him inland or some advantage appears to be derived from such a movement. Apparently, there has been nothing to urge or induce the coast people of Mindoro to move into the interior.

The interior is to a great extent unoccupied, but scattered all over this part of the island are a primitive people who generally are known by the name Mangyan and who probably number from 5,000 to 20,000 souls. Owing to the lack of trails and the consequent difficulty of gaining access to these people, it is practically impossible at the present time to form an accurate idea of their number.

So far as I can judge from my own acquaintance with the Mangyans[1] they are an entirely friendly, harmless people, peaceable to the point of timidity. Weapons are not common among them, and in some sections they seem to have only working tools and appear to be without offensive weapons of any kind. I should add that there is one section of them of whom I have seen little. They live west of Bongabong on the east coast; a part of them are known as Bangons and a part as Bukils. It is these people who are said to have tails, according to a story told by the coast Filipinos. If the few Bukils whom I have seen were typical, their costume, customs, and general appearance indicate that they are closely allied to the Mangyans elsewhere in Mindoro. My interpreter, who talked without difficulty with the Mangyans near Bulalakao on the east coast, found it no easy matter to understand the Bukils in the interior. The fact that he could understand them at all, even though with difficulty, shows that the dialects in use by the two peoples are closely related.

The best way to give a picture of these widely-scattered people will be to describe the inhabitants of some one limited section, at the same time indicating the details in which those of other parts of the island differ from the people of the section described.

Various settlements of Mangyans, containing from 8 to 30 people, are found near Bulalakao, at distances varying from three to six hours' travel on foot. Some of these are on steep hillsides in a limestone region where the soil is thin. Even the crops are planted on hillsides so steep that the use of animals would be impracticable, even if the people had work animals. In these locations advantage is taken of any small level spot for erecting two or three small houses. The people live in them for years, apparently until the houses are about ready to fall. Because of the topographic conditions, it might not be easy in all cases to find a suitable site for a large number of people to live together.

Other settlements are located on rolling land not far from the ocean, where the soil appears to be rich and deep. In these places there is nothing to interfere with the building up of comparatively large settlements, excepting the disinclination of the people. A brief, detailed statement, describing the location of several of the settlements, will throw some light on the life of the Mangyans.

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[1] I have visited them in five widely separated localities.

Dangas,[2] about five hours' walk from Bulalakao, is reached by traveling over a hilly country gradually rising until the last half-hour of the journey, when the trail becomes so steep in places as to be almost a cliff. A gently sloping ground, where there are 5 houses, is found above this cliff. About 20 people live here. One hour beyond Dangas is another small settlement of 5 houses and about 30 people. The trail from Dangas leads up the ridge of a long, steep hill, across a narrow valley, and part way up the opposite slope. The houses are on a small, flat spot on the hillside. Budburan, a settlement of 3 houses, is located in a rolling country about 3 kilometers from the ocean and five hours' travel on foot from Bulalakao. Here there is a large area, alternating between grass-covered and wooded country, where thousands of people might live.

In the interior of Mindoro I saw no groups of houses nor even two houses in sight of each other. The majority of the few houses which I saw were located at points on steep hillsides where the slope was a little more gentle and offered space for a small house. The cultivated fields were close by. I saw a few little hovels, built near small streams, just high enough above the stream to be safe in time of high water. These hovels appeared to be temporary, the more permanent homes being on the hillsides far above the streams.

Near Abra de Ilog many of the Mangyans live in isolated houses built high on steep hillsides like those in the interior of the island. Here, too, as well as along the Bakó River and on the shores of Lake Nauhan, there are small groups of houses hidden away in the forest near the clearings and usually near a small stream.

HOUSES.

The houses in which the Mangyans near Bulalakao live are like those built by their Christian neighbors. When they are new they are neat and attractive, but they are allowed to deteriorate, although people continue to live in them as long as they are at all habitable. They are built from 1 to 2 meters above the ground. The roof and the sides are usually of nipa or buri palm.[3] The leaves, of which the sides are made, are held down by horizontal strips of bamboo about 30 centimeters apart. The floor is of split bamboo, sometimes made neatly of strips of uniform width, but more often of pieces of bamboo split open and laid out flat. The doors and windows are sometimes arranged to slide along a bamboo pole and sometimes to swing upward and outward. The houses are of good height, so that it is possible to stand erect almost anywhere inside, although it is necessary to stoop a little in order to pass through the door. Access to the house is gained by means of a short bamboo ladder made as wide as the door.

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[2] Lisboa Vocabulario de la lengua Bicol, gives: *Añgas*=*Añgpás*, steep cliff; *Parañgasan*, open place which the (prevailing?) wind strikes from the front.

Just outside the door there is often, but not always, an open-air platform on a level with the floor of the house. This is used in fair weather by the owners when pounding out *palai*[4] or when engaged in other household duties; it also serves as a lounging place.

Within the house there is usually a bench at one side about 50 centimeters above the floor and 40 centimeters wide. This is made of 1 or 2 hewn boards and is fastened to two of the main posts of the house by rattan. The fireplace is made by fastening together 4 pieces of wood or bamboo into a quadrilateral and filling the space thus inclosed on the floor with earth to a depth of from 8 to 10 centimeters. Three stones serve as a rest for each vessel to be put over the fire. In one corner of the house there is either a large earthenware jar or a number of pieces of bamboo for holding water.

Suspended from the roof timbers are a few baskets which may contain *camotes*,[5] bananas, maize, or some pieces of clothing. A few wooden spoons may be seen placed behind the roof beams. Sleeping mats are rarely seen. On the whole, the house furnishings are scanty.

The Mangyans sometimes build small, rude shelters near their cultivated fields in which they live while sowing, caring for, and harvesting the crops. They do this partly because it is more convenient to live near-by while they are putting in the crops and partly to protect the latter from birds and other animals while they are maturing. After harvesting the crop, they return to the place where they ordinarily make their homes.

The Mangyans in the neighborhood of Bulalakao build the best houses and are in general the most prosperous of all these people in Mindoro. Those of Abra de Ilog and the Bakó River live in rude little huts which usually have no sides. The eaves are so near the floor of the hut that sides are really not necessary. The floor is from 30 centimeters to 2 meters above the ground, and is made either of small poles or of the bark of trees. Buri palm leaves are used to make the roof. Many of these houses are so low that a white man can not stand erect in them except in the center under the highest part of the roof. When the floor is more than 1 meter above the ground, the hut is entered by means of a notched log or by 2 small logs laid in the form of an ⋈ along one side of the house. Even these simple houses may be occupied for several years.

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[3] Nipa palm, *Nipa fruticans* Wurmb.; buri palm, *Corypha elata* Roxb.

[4] Unhusked rice.

[5] *Ipomoea batatas* Poir.

For lights the Mangyans use a resin from a tree known as *palsahingen.*[6] This resin is wrapped in a green leaf of the buri palm. The use of this kind of light is widespread in the Philippines.

PHYSICAL APPEARANCE.

There is much difference in the appearance of the Mangyans in different parts of Mindoro. Some are large and well developed and appear like Christian Filipinos; others are small with slight physical development; while a few show signs of having Negrito blood.

Practically all the Mangyans have blackened teeth. This condition is a result of the continual chewing of betel-nut. Occasionally, a man is seen who has white teeth. This is a person who, for some reason, does not care to chew betel-nut and whose teeth have in consequence remained the natural color.

The Mangyans near Bulalakao are as large and have as good physiques as the average Christian Filipino. The women seem to be less well developed than the men. This may easily be because of the fact that they marry while still very young, sometimes when they have hardly passed out of girlhood. Many of them, too, work hard.

If these Mangyans were to dress and live as do the Christian Filipinos, it would not be possible to distinguish one from the other. The same can not be said of all the people of the interior.

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[6] *Canarium villosum* F.-Vill. This is a large tree of the *Burseraceae* which furnishes great quantities of resin. In Camarines Province, Luzon, torches are made of this resin and are called *sálong*, the Bikol equivalent of Tagalog *sáhing*, pitch, resin.

Some of them are as well developed as the people near Bulalakao, but others are small and thin and poorly nourished. As there is no evidence of Negrito blood among them, their slight development may be ascribed to lack of nourishment.

Dr. Fletcher Gardner, who saw much of these people while he was stationed at Bulalakao, says of them:[7]

> In appearance the Hampangan Mangyans are pure Malay, of rather small stature, of rather light color, often plump, well formed, and, by Malay standards, good looking. The hair is usually straight, rarely wavy, and never very curly or kinky. The teeth are usually black and worn, from constant use of betel-nut, without cleansing, a fact that led Lander to state that they file and blacken their teeth. The use of betel-nut begins very early among them, so that the appearance described may often be observed in comparatively young persons. They tattoo the body.

Some of the Mangyans in the Bakó region show evidence of Negrito blood. Curly hair is not uncommon and even closely curled hair may be seen. Sometimes, too, one sees the large, round, typical eyes of the Negrito. A few Mangyans have beard enough so that they sometimes shave with a jack-knife.

If, as seems very likely, there is some Negrito blood in the Mangyans of the Bakó region, this fact would account for the small stature which is common among the people there.

I made inquiries among these people in various parts of Mindoro to find out if they had any tradition of the former presence of Negritos among them,[8] but was invariably told that they had never known of any Negritos in Mindoro. The appearance of some of the Mangyans makes me believe that there were formerly Negritos in the island. Also, I made careful inquiries about the existence of white people among them, and always received an incredulous denial. The white tribe, I have no doubt, is a myth, which may have been founded on the occurrence of one or of a few albinos among the Mangyans.

I attempted to trace to its origin the story of people with tails. As might be expected, I learned nothing tending to establish its truth.[9] This is a story which is by no means confined to Mindoro. Eight years ago, when I was at Sablayan on the west coast of Mindoro, I was told that there were people with tails living near by. I visited the house where they were said to live and saw one woman who had a large malignant growth at the end of the spinal column. Of course, the existence of one such person is sufficient foundation for a story that there are people with tails. Whether the story in Mindoro has any more foundation than this I am unable to say, but I doubt if it has.

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[7] Unpublished manuscript in the division of ethnology, Bureau of Science.

[8] Lisboa, Vocabulario de la lengua Bicol (written between 1594 and 1618), says: "Mangyan. Negrillos mas bosales que los demas." The Spanish dictionary gives *bozal* (not bosal, but confusion between *s* and *z* is common in Lisboa) as "stupid." This indicates that in Lisboa's time Negritos were believed to exist in the Mangyan territory although probably at that time there were Mangyans elsewhere than in Mindoro.

[9] According to Gardner (unpublished manuscript), the Mangyans, who live near the coast, as well as some Christian Filipinos hold the belief that the Bangon Mangyans, living near Bongabong, have tails.

DRESS.

Near Bulalakao the Mangyan men all wear loin-cloths as the principal item of their dress. These are almost invariably made of white cotton cloth. The cotton is raised, spun into thread, and woven into cloth by the people themselves. The ends of the loin-cloths are embroidered with red and blue cotton yarn. The men usually wear also a short jacket made of the same kind of cloth as the loin-cloths. These are sometimes dyed blue, but are more often white. They are embroidered with red and blue cotton yarn around the lower edge, the neck, and wrists, along the two front edges, along the outer seam of each sleeve, and along the middle seam in the back. Aside from this embroidery, the jacket is entirely plain. The outer seam of each sleeve is sewed at intervals only and presents a kind of slashed effect.

Besides the cord to which the loin-cloth is attached, a belt is worn around the waist. It is made of *buri* 8 to 10 centimeters wide in the middle and tapering to a small loop at one end and a wooden button at the other. The wide middle part has a pocket in which betel-nuts, tobacco, money, and other small articles are carried. In the interior of Mindoro and near Abra de Ilog these pocket belts are of the same style, but are only 3 or 4 centimeters wide in the middle.

Strings of beads are worn around the neck, sometimes in such quantities as to weigh several pounds. I saw one man with coils of copper wire around the neck. A few men wear short strings of beads suspended from the ear lobes and a few strings around the calves of the legs.

The hair is worn long, gathered in a knot low on the back of the head. Around the head, a red cloth is usually worn which serves to keep the hair in place both in front and behind. This is the rule near Bulalakao, but the Mangyans elsewhere, notably near Abra de Ilog and Lake Nauhan, wear the hair short. The men and less often the women wear armlets on the upper arm made of black and red rattan. These are sometimes worn alone and sometimes are used to hold in place the sweet-smelling roots and the cocks' feathers which they, especially the young men, like to wear.

The women wear a cloth about the loins tucked in at the waist and reaching just below the knees. This is of native-grown cotton and is often dyed dark blue. They also wear a belt, woven of *nito*,[10] 8 to 10 centimeters wide around the abdomen and often another similar band to cover the breasts. At times, instead of the breast band, they wear a short cotton jacket which differs from that worn by the men in some details. It has no opening either in front or in the back, the seams of the sleeves are entirely sewed up, and the only embroidery is around the wrists.

For decoration the women wear masses of beads around the neck and great quantities of strips of rattan dyed red wound around the abdomen. The hair is gathered in a knot at the back of the head, and around it is worn a circular band made of *nito*, rattan, and *buri*, in black, red, and white respectively. Strings of beads or bands of brass wire are sometimes worn around the wrists, and ear plugs are inserted in the lobes of the ears.

Among the Mangyans in other parts of Mindoro no striking variation in the dress of the men occurs. Nowhere else save near Bulalakao is any native-made cotton cloth seen, and nowhere else are the jackets made in the native style. The loin cloths are made either of tree bark or of European cloth. Jackets are either not worn or, if worn, are of the Christian Filipino style. The pocket belt is only 4 centimeters wide instead of 8 or 10. Very few beads are worn except by the Mangyans near Bulalakao.

The dress of the Mangyan women varies much from one part of Mindoro to another. Near Abra de Ilog a cloth is wrapped around the waist and under this cloth a woven band of *nito* is worn. The women also wear a loin-cloth under the skirt, but neither a jacket nor a *nito* breast band, and sometimes they have rings on their hands and grasses thrust through a hole in the lobe of the ear. In this region they neither weave cloth nor use bark cloth. They get cloth either by working for the Christian Filipinos or by exchanging forest products for it. In the Bakó River region, on the other hand, they either buy cloth from the Christian Filipinos or use beaten bark.

Along the Bakó River it is the exception rather than the rule to see a woman with a cloth around the loins. Her ordinary costume is a loin-cloth of beaten bark, a great mass of woven *nito* and rattan wound around the abdomen, and a breast band of *nito* and *buri*. The latter is not always worn, but no part of the rest of the costume ever is dispensed with. The loin-cloth is short and is passed both in front and behind over two or three of the strands of the woven *nito* which is wrapped about the abdomen. A red kerchief is sometimes worn around the breasts instead of the *buri* band already described.

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[10] *Lygodium circinnatum* Sw.

The age at which children wear clothes varies from about 10 or 11 years near Abra de Ilog to 5 or 6 at other places. Their clothes are the counterpart in miniature of those worn by their parents.

I saw no evidence among the Mangyans anywhere of tattooing or scarification, or of teeth or body mutilations, except perforations of the ears for the suspension or insertion of ornaments.

Hats are rarely worn. Of the few which I saw all but one had been obtained by the Mangyans from their Tagalog neighbors. The one exception, worn by a Mangyan working in a clearing, was hewn out of a single piece of wood. It was made so thin and of such light wood that it weighed very little more than many woven hats.

INDUSTRIES.

The work of the Mangyans is devoted almost entirely to gaining subsistence, but they have a few industries not directly connected with the question of food. None of the people whom I visited make pottery, although I was told there are Mangyans in the hills west of Bongabong from whom cooking vessels are sometimes obtained. They get most of the pottery vessels which they use from the Christian Filipinos in exchange for *camotes*, maize, *palai*, and bananas.

In the vicinity of Bulalakao the Mangyans plant cotton. The process of converting this into cloth may be described briefly as follows:

The first task in preparing the cotton for weaving is the removal of the seeds. A woman takes a small, hard, smooth piece of wood about 50 centimeters long by 15 centimeters wide and a piece of smooth bamboo about 40 centimeters long and 3 centimeters in diameter. She places the piece of wood on the floor or on the ground and kneels in front of it with a basket of cotton at her side. Then she takes a little of the cotton from the basket, places it on the piece of wood, and rolls the bamboo over the fiber, forcing the seeds ahead of the roller and out of the cotton.

After the seeds are all removed, the cotton is spread out on a mat, and several people sit on the floor around it and beat it with flexible sticks. This is done to detach the fibers one from another so that the cotton can be readily spun into a thread.

The fiber is next wrapped in a piece of dry hemp or banana stalk and is ready to be spun. The bundle of cotton is held in the left hand, a little is drawn out with the right, and is attached to the spindle which is held in the right hand. A stone whorl is fastened to the lower end of the spindle to keep the latter revolving when once it has been set in motion.

After the cotton has been fastened to the spindle, the latter is set revolving rapidly and the left hand holding the material is gradually raised as high as the spinner can reach. After the thread has been sufficiently twisted, the left hand is slowly lowered, the thread is wound around the spindle, and the process is repeated. It only remains to weave the thread into cloth. This cloth is about 15 centimeters wide for loin-cloths and about 50 centimeters for jackets, blankets, etc.

In no other part of Mindoro did I see any cotton growing nor any evidence that the people are in the habit of weaving cloth.

Near Bulalakao, also, the Mangyans make many neat little baskets of *buri* and *nito.* Some of them are bags designed to be worn on the person for carrying betel-nuts, tobacco, lime, or other things. These are flexible. Others are octagonal in shape, often with two of the sides much larger than the others. They vary from 7 to 18 centimeters in extreme length and from 3 to 10 centimeters in depth. They have a close-fitting cover which is as deep as the basket itself and which has a cylindrical extension in the center of the top which serves as a handle. This handle is usually about 2 centimeters in diameter and 5 centimeters high. It is stuffed with cotton to give it some rigidity. The baskets are made in two and sometimes in three colors, white, black, and red. The white is of *buri,* the the black of *nito,* and the red of dyed bamboo. The Mangyans occasionally make small, flat, telescope baskets for carrying betel-nuts, tobacco, and similar articles. These are about 14 centimeters in length, 10 centimeters in breadth, and 3 centimeters in thickness, and are made of *buri.*

The Mangyans everywhere make a few household baskets and a few for bringing home *camotes* and other field products, but they do not make them in great quantities.

AGRICULTURE AND FOOD SUPPLY.

All over Mindoro the Mangyans are agriculturists. Of course, they catch a few birds and occasionally kill a wild hog with lances or catch a *tamarao*,[11] a hog, or a carabao in a snare, but by far the greater part of their food supply comes from cultivation of the soil. They follow the *kaingin*[12] system as do also most of their Christian neighbors; that is, they make a new clearing every year or at the most every two years, in which they plant rice. The Mangyans know and value American axes highly. When they have them, they use them in making clearings. When they have no axes, *bolos*[13] are used for clearing the ground of brush and trees. Even large trees are cut down. When the brushwood is dry it is piled up and burned. The rice is planted by making small holes in the ground with a pointed stick and dropping 2 or 3 grains of rice into each hole. As one passes through a field which has been planted a week or ten days before, he notices grains of rice lying on the ground uncovered. Probably for this reason a considerable percentage of the grain does not sprout.

Sometimes these clearings for rice are on level or rolling land, as at Badyang and along the Bakó River; at other times on the steepest of hillsides, as in the interior of Mindoro and near Abra de Ilog. Whether the land be steep, rolling, or level, the unirrigated type of rice is always planted. Throughout Mindoro, among the Mangyans, the crop is rarely, if ever, sufficiently abundant so that the rice lasts from one harvest to another.

In planting, the men make the little holes for the grains and the women drop the seeds. The sticks used in this work are placed together standing near the center of the clearings after the planting is done. The Mangyans say that they do this to protect the rice from the spirits in the ground whom they have never seen, but who really exist according to the statements of the old people. If these sticks are left lying on the ground, the rice will fall down. This they say they learned from the Tagalogs.

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[11] *Bubalus mindorensis* Heude.

[12] A word which describes a common Philippine custom of clearing a piece of ground, turning it over, and cultivating it for two or three years until the weeds and grass become thick. This land is then abandoned and another similar clearing made elsewhere.

[13] A common name throughout the Philippines for the ordinary large working knife. See footnote under "*bolo*" in Schneider's Notes on the Mangyan Language, this number.

Another principal item in their food supply is *camotes*. These grow rapidly without much care and yield abundantly. A *camote* field once set out may be used for two or three years, while as a rule but one crop of rice is obtained from a clearing. When the time again comes for planting, the grass is so thick in the clearing of the year before that it is easier to make a new clearing than to get rid of the grass in the old one.

At Piña, Burabud,[14] and Badyang near Bulalakao, there seems to be a tendency to establish permanent settlements and cultivate old clearings. I have no doubt that if the people had a few simple agricultural implements to enable them to keep the ground free from grass and weeds, this tendency would develop, and after a short time there would be settled communities at these places.

Along the Bakó River and near Abra de Ilog no such tendency is apparent. Great numbers of clearings on the side of Mount Halcon may be seen from the sea. These in all probability have been made by Mangyans, but have become overgrown with cogon grass and are no longer used for planting crops. A small body of Mangyans making new clearings every year or two would soon clear a large area of forested land.

In addition to rice and *camotes*, the Mangyans plant yams (*ubi*),[15] taro (*gabi*),[16] squash, bananas, and beans. They have also papayas.[17] When I was at Dangas and Piña, the people seemed to have enough to eat, although they had no rice. At Burabud, however, they had very little. Storms had destroyed their banana plants and the hot sun had prevented their *camotes* from maturing. They had a few yams and occasionally found a bunch of bananas which, although still green, were far enough advanced so that they could be cooked and eaten. These people lived near the ocean and caught some fish. This was of great help, especially in a time of shortage.

There is little else about their agriculture which calls for comment. When supplies of food fail or run low, the Mangyans go into the forest and gather various edible roots. One of these which they call *korót* (the *namí* of the Tagalogs)[18] is said to require soaking three days in salt water and three in fresh before it is fit to eat. It is then sometimes dried and pounded and sometimes cooked without drying.

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[14] Burabud in Bikol signifies "spring."

[15] *Dioscorea alata* L.

[16] *Colocasia antiquorum* Schott.

[17] *Carica papaya* L.

[18] *Discorea daemona* Roxb. *See also* Reed, W. A., Negritos of Zambales. *Pub. Phil. Ethnol. Surv.* (1905), 2, 40.

One of the most prosperous settlements in Mindoro from the point of view of food supply is known as Ak-si-gang near Abra de Ilog. About 24 people live here and it has been their home for six years. One man has 13 coconut trees almost ready to bear fruit and 50 more which are three years old; he also has 30 breadfruit trees all bearing. The people of this settlement also plant the customary crops, rice, *camote,* maize, taro, yams, squash, beans, papayas, and lemons. They say they use the last as medicine for fevers. They catch wild hogs and deer with spring traps and lassos. They keep hogs to kill, and eat chickens, eggs, and honey.

The people at Aluyan, a small settlement near Abra de Ilog, say that they kill fish with a poison known as *tuba kamisa,* the croton oil plant.[19] They crush this poisonous fruit and throw it into the water; the fish soon become stupified and are easily taken. They also catch monkeys for food by means of snares set in the trees. Some of them eat iguanas and some do not.

Mangyan methods of cooking are common all over the Philippines so far as my observation goes; however, these people do not use the earthenware stoves or fireplaces which are employed by the Christians. They cook by placing the cooking vessel on 3 stones over a fire. The people of Aluyan at least know how to cook rice in a joint of bamboo or in the bark of a tree when they have no better vessels.

WEAPONS.

In the settlements near Bulalakao some of the Mangyans make and use simple bows with bamboo-pointed arrows. The latter are poisoned and are used in hunting game. They have lances also with which they hunt wild hogs.

Among the Mangyans on the north coast of Mindoro I saw no bows and arrows. Spears also seemed to be scarce. The people in the Bakó region sometimes use spears, which they get from their Tagalog neighbors, in hunting wild hogs. They say that they are afraid of the *tamarao* and never try to catch it.

FIRE MAKING.

The Mangyans have several ways of making fire. In the settlements near Bulalakao some men carry a flint and steel and tinder for this purpose. Others make fire by the use of two pieces of bamboo, and still others with a piece of rattan and a piece of bamboo. The second of the three methods may be described as follows:[20]

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[19] *Croton tiglium* L.

One edge of a piece of bamboo is sharpened. It is then firmly fastened at an angle of about 45° with the lower end away from the operator. It may be fastened against a post in such a way that the man who is to use it can, by putting one arm on either side of the post, bring the weight of his body as well as muscular force into play. On the convex side of another similar piece of bamboo a shallow groove is cut; on the concave side, at right angles to the groove on the convex side, another is cut until a small hole is made where the two grooves intersect. A few fine shavings are scraped off the bamboo, placed in the groove on the concave side so as to cover the small hole, and held pressed together. This second piece of bamboo is then held firmly in the two hands, the groove on the convex side is placed on the sharpened edge of the other piece, and the bamboo is rubbed rapidly backward and forward and at the same time is pressed down hard. In a few seconds smoke issues from the point of contact of the two pieces and soon the fine shavings are afire. This is the method in use near Bulalakao.

In the Bakó region practically every man met with, and some women as well, wears on the left upper arm 1 or 2 or 3 armlets of rattan. These appear ornamental, but are used in making fire. A piece of dry wood about 3 centimeters in diameter is selected, one end of it is split for a distance of 12 to 14 centimeters and a plug is put in to keep the slit open. A few shavings are then put tightly into the slit where it is narrow. One of the armlets is taken from the arm, unwound, and passed around the split stick just under the shavings. The split stick is held firmly on the ground with the two feet and the rattan is drawn rapidly backward and forward until the shavings ignite. A few seconds usually are sufficient.

I have seen no other method of making fire in Mindoro excepting, of course, by the use of matches. The Mangyans are acquainted with matches and like them.

FAMILY LIFE.

Only long acquaintance with the Mangyans would enable the observer to know well their family life. As a rule I have no doubt that as among most people monogamy prevails and that the man and woman are faithful to each other, but at various places throughout the Mangyan area I met men who had two wives. As nearly as I could find out the principal reason for this was in order that the man might have two women to work for him instead of only one.

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[20] Compare also fire-making methods in use among the Negritos of Zambales. Reed, Negritos of Zambales, *loc. cit.*, 40.

On the Bakó River in one settlement I was told that a man sometimes has two wives. In another settlement not far from the first the people said that a man married only one woman whom he never deserted; an unfaithful man or woman was punished by a beating by the old people. At still another settlement a man was married to two women who were sisters. The first had no objection to the man marrying the second. From the occurrence of cases of polygamy at widely separated points in the Mangyan territory and from the fact that inquiries made in the short time I was among them brought to light several such cases, I am inclined to infer that the practice is not uncommon.

Marriage is rare between Mangyans and Christian Filipinos. It is probable that the Christians have some prejudice against marrying Mangyans. Whether the latter in general object to such mixed marriages I am unable to say. One Mangyan told me that if they were to marry with the Christians both parties to the marriage would fall ill. I think it is likely that at some time in the past a Christian Filipino and a Mangyan woman married, and that the woman caught some infection from the man. The existence of a tradition that serious illness will follow a marriage between the two people is difficult to explain except by some such hypothesis as this.[21]

The names of both men and women in some parts of the

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[21] "The largest social unit seems to be the family, and all the people living in a *rancheria* will usually be found to be related either by blood or marriage. The head of this loose aggregation will almost always be the oldest man, the only exception being when he is too feeble to take any part in the government of the *rancheria*, when his duties are taken by the next oldest, although even then his counsel will be listened to with respect. The chiefship, if it amounts to such, is not hereditary. The powers of the chief are also quite limited. Disputes are settled by a council of the old men of the same or neighboring *rancherias*, and the decisions of these courts are looked on as final."

The above is from the manuscript of Dr. Fletcher Gardner on the Hampangan Mangyans of Mindoro. These are the people near Bulalakao. It is probable that a similar form of social organization may be found among Mangyans elsewhere in the island.

Mangyan country seem to be but little used, as in calling a person they do not use the name, but merely a call to attract attention. Men sometimes do not even know their wives' names, if one may believe what they say. However, I suspect that this is not true. The statement was probably made for fear that they would be asked to give their wives' names and from a reluctance to do so.

CHILDREN.

Children are usually born in the house where the parents live. No special house is built for the prospective mother. The father is often present at the birth but it is the old women who assist the mother. Many children are still-born, and the mother, too, often dies. Twins are sometimes born, but the people told me they had never heard of triplets.

Gardner says of the Hampangan Mangyans that—

> Infanticide by burial alive is allowed and even considered praiseworthy in time of scarcity, and is defended on the ground that the mother who suckles her child will most probably die, but if she has all her strength and time to give to the search for food, she will probably live.

The people near Abra de Ilog say that infanticide is never practised. They say they want children.

Circumcision is not common among the Mangyans, but there are those near Abra de Ilog who practise it. The operation is performed with a knife or a *bolo*, and at any time between the ages of 1 and 14. They say that the operation is for the greater convenience of a man after marriage. I was told that the boys suffer no ill effects as a result of it.

DEATH AND BURIAL.

At several places the Mangyans said that they were formerly more numerous than now. Near Abra de Ilog many have died from hæmorrhage of the lungs and from small-pox, but not from cholera. They do not seem to be a prolific people.

Burial customs vary widely from place to place. At Burabud in a small jagged cave in a limestone cliff were the remains of 8 people (3 children and 5 adults) wrapped in their clothes and laid on small bamboo platforms. This was the burial place of one family. The man whose relatives were buried here said that this place was for his family only and that he did not know where other people put their dead. It does not seem likely that the latter part of this statement is true. In this place it is customary to bury a dead person for a year, then to dig up the bones, wrap them in the clothes formerly belonging to the dead person, and, together with the beads, baskets, and other things which were his, to place them in some rocky cave or on a cliff.

At Abra de Ilog the dead are buried at some place near by, the grave is surrounded with a good fence, and a few days later the people move away from the place. The clothes and everything else belonging to the dead person are buried with him; he is not put on a cliff nor in a cave.

At Aluyan the people say that after a death and before they abandon the place where they have lived, they burn the house because there are many *bu-kau,* malignant spirits, near by. In all the trees and paths near where the person died they put lassos so that the spirits can not pass.

About Lake Nauhan the dead are buried a long distance from the place where the people live. They do not abandon their houses after a death. For the burial they select a place which is well drained so that when the rains are heavy it will not become muddy.

In the Bakó region, when a person dies, the people at once abandon the place even though the crop is about ready to be gathered, and they do not return for perhaps five years.

The Mangyans at Aluyan say that if one of their number falls ill of small-pox they all leave him; even the mother deserts the sick person, although the father sometimes remains. If they hear of small-pox among the Christians in town, they move to some distant place and send word to the Christian people not to come to them.

RELATIONS WITH CHRISTIAN FILIPINOS.

With the exception of the people of the interior, all the Mangyans of Mindoro seem to be on friendly terms with the Christian Filipinos. From the association between the two peoples, the latter appear to be by far the greater gainers. The Christian people of Bulalakao, according to the statement of some of their own number, practically live on the labor of the Mangyans. The latter do not often bring to town their products, but the people of the towns go out to the Mangyan settlements, taking with them cloth, *bolos,* beads, and other cheap merchandise which the Mangyan wants and which they exchange for maize, *camotes,* bananas, and other food products. Some of the Mangyans are also employed by the townspeople in making clearings. They are rarely, if ever, paid in cash for such services. Rice, if they happen to need it, cloth, cooking vessels, and *bolos* are the most common forms of payment.

The Mangyans near Abra de Ilog are less prosperous than those near Bulalakao. The consequence of this condition and, perhaps also, to some extent the reason for it is that they have come to be more dependent on their Christian neighbors by whom they are often employed. Their labor consists in making clearings, planting and harvesting crops, and getting out logs for timber.

For cutting down trees and hewing out logs I was told that 3 Mangyans for two days' work received an American ax and a *bolo*. If this information was correct, the Mangyans were being paid about 50 centavos per day each. Even if in a few cases they were paid so much, it is extremely doubtful if as a rule they receive more than the equivalent of one-half this amount.

DIVISIONS AMONG THE MANGYANS.

I have referred already to the Bangons and the Bukils. The former are said to live in the interior of Mindoro, the latter between the Bangons and the coast Mangyans. It is reported that some of the Bangons live during certain months of the year in holes in the mountain side and that they keep young pythons until they have grown to a suitable size, when they kill and eat them. They are said also to eat lizards and rats. All this information about a people in the interior, who are rarely seen and of whom the coast people are afraid, has to be accepted with many reservations. On the two trips I have made across Mindoro, I have seen no signs of cave dwellings nor of any people who differ in any marked details of dress or mode of life from the coast Mangyans.

The fact that there is a considerable difference between the dialects of the interior and of the coast people indicates that even if the two are fundamentally one they have had little to do with each other for so long that their dialects present marked divergences. There is a slight difference of speech between places as near together as Mamburao on the west and Abra de Ilog on the north coast. The fear which the people of the interior have of strangers shows that they rarely, if ever, leave the hills where they live.

I think it is more probable than otherwise that all the pagan people of Mindoro belong to one tribe, with customs much alike everywhere, but with dialectic variations from one section to another due to long separation and lack of intercourse.

LANGUAGE.

The language of the coast Mangyans at least belongs to the Philippine family of languages. This is clearly shown by the study of the brief vocabularies which I collected, made by Mr. Schneider of the Bureau of Forestry.[22]

One of the most interesting things about the Mangyans is the existence among a certain small section of them of an ancient system of writing. I made careful inquiries everywhere I went among them for people who knew how to write. I found them in only two settlements near Bulalakao and in no other part of the Mangyan country.[23] I heard of one man at a settlement also near Bulalakao who could write.

Even in the places where the ability to write is found, it is by no means a universal accomplishment. At Dangas there were two people who knew how to write and at Budburan there were seven, two of them women, but not all of these nine people could write readily. Naturally, since the ability to write is not widespread, no great use can be made of it. However, writing occasionally is employed in sending a message from one place to another. These messages are usually written with a knife on a node of bamboo or on a split piece of a node.

Whatever may have been the practice in the other Philippine systems of writing formerly in use, the Mangyans at the present time write horizontally from left to right.[24]

A comparison of the Mangyan writing with the systems in use at the time of the arrival of the Spaniards among the Iloko, Tagalog, Pampanga, Pangasinan, and Bisaya peoples reveals a close resemblance in general character and in some of the symbols used. Only three of these symbols represent letters, all the others syllables, so that the series of characters is a syllabary rather than an alphabet. The three letters which are represented by symbols are the vowels *a*, *e* or *i*, *o* or *u*. The simplest form of the other characters represents the various consonants together with the vowel *a*. These characters represent the syllables *ba, da, ga, ka, la, ma, na,* etc. The addition of a short mark, usually a straight line, above these characters changes the vowel to *e* or *i*, so that we would have *bi, di, ki, li, mi, ni,* etc. The placing of the same short mark below the character gives the vowel value *o* or *u*, and we would have *bo, do, go, ko, lo, mo, no,* etc.

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[22] This number, p. 157.

[23] Mr. R. C. McGregor of the Bureau of Science informs me that he knew a man on the Bakó River who could write on bamboo.

[24] T. H. Pardo de Tavera has shown in his pamphlet, Contribución para el estudio de los antiguos alfabetos filipinos, that it is very unlikely that the ancient Filipinos originally wrote from below upward and that under the influence of Spanish writing they changed to a horizontal left to right order. The Mangyans probably came very little under Spanish influence and the fact that they now write horizontally from left to right supports Tavera's contention. On the other hand Lisboa says: "Porque ellos [the Bikols] escriben y leen de abajo hacia arriba."

Certain inconveniences and inaccuracies in such a system of writing are apparent. Neither a combination of consonants nor a terminal consonant can be represented, but only a single consonant followed by a single vowel. For example a Mangyan who was writing for me on a piece of bamboo had occasion to use the Spanish word "trabajo." This he represented by the characters for *ta-ra-ba-ho*. "Salamat," the common Filipino word for thank you, is written *sa-la-ma*, the final consonant not being represented. "Barrio" appears as *ba-yo*, "Agosto," as *a-go-to*, and so on.

These facts, for a person familiar with the system of writing, make it much easier to write than to read it.[25]

There is nothing strange in the fact that the Mangyans, one of the least advanced of all the people of the Philippines, should have a native system of writing, while all the other people of the Islands who can write at all, with the exception of the Tagbanwas of Palawan, use the Roman alphabet.

When it is remembered that at the time of the arrival of the Spaniards there were systems of writing in use among the Ilokos, the Pampangas, the Pangasinans, the Tagalogs, and the Bisayas, and probably also among the Mangyans and Tagbanwas, and when the great advantages which an alphabet presents over a syllabary are considered, it is not surprising that those Filipinos who came most in contact with the Spaniards abandoned their old systems in favor of the Roman alphabet, while those who were remote from Spanish influence continued to use them, even down to the present day.[26]

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[25] T. H. Pardo de Tavera, *op. cit.*, points out that in the ancient Tagalog writing two characters for *le* or *li* following each other might be read *lili, lilin, lilip, lilis, lilim, liclic, liglig*. The characters for *ba* and *ta* might be read *bata, batang, batas, banta, bantay*.

[26] I hope to have within a few months some additional data on Mangyan writing and to publish a more detailed account of it than is possible at the present time.

ILLUSTRATIONS.

PLATE I.

Group of Mangyan men and girls, near Bulalakao, Mindoro. (Photograph by Martin.)

PLATE II.

FIG. 1. Mangyan man, near Bulalakao. (Photograph by Martin.)

2. Mangyan man, Bakó River, Mindoro; hair shows evidence of Negrito blood; armlet on right arm is for holding feathers or fragrant herbs, that on the left arm is rattan for making fire. (Photograph by Martin.)

3. Mangyan man, near Bulalakao. Note slashed sleeves. (Photograph by Miller.)

4. Mangyan girl, near Bulalakao, wearing breast band. (Photograph by Martin.)

PLATE III.

FIG. 1. Mangyan man, near Bulalakao. Note slashed sleeves, pocket belt, and loin-cloth. (Photograph by Miller.)

2. Mangyan man, near Abra de Ilog, in typical costume. (Photograph by Miller.)

PLATE IV.

FIG. 1. Mangyan woman, Bakó River, wearing braided *nito* over the abdomen and a loin-cloth. (Photograph by Miller.)

2. Mangyan woman, Bakó River, in typical costume. (Photograph by Miller.)

PLATE V.

FIG. 1. Jacket and loin-cloth of native-grown cotton worn by Mangyan men, near Bulalakao. (Photograph by Cortes.)

2. Baskets made by Mangyans; the smaller ones are made by the people near Bulalakao, the larger one by those of the Bakó River. (Photograph by Cortes.)

PLATE VI.

FIG. 1. Jacket, of native-grown cotton, worn by Mangyan women near Bulalakao, and loin-cloth of beaten bark, worn by Mangyan women of the Bakó River. (Photograph by Cortes.)

2. A, Braided *nito*. B, Strips of bamboo dyed red. C, Breast band made of *buri* and *nito*. D and E, *Nito* abdominal or breast bands. F, Head band. (Photograph by Cortes.)

PLATE VII.

FIG. 1. Mangyan woman, near Bulalakao, rolling seeds out of cotton fiber. (Photograph by Miller.)

2. Beating cotton to separate the fibers. (Photograph by Miller.)

PLATE VIII.

Mangyan woman, near Bulalakao, spinning cotton thread. (Photograph by Miller.)

PLATE IX.

FIG. 1. Better class of Mangyan house, near Bulalakao. (Photograph by Miller.)

2. Group of Mangyan houses, Bakó River. (Photograph by Miller.)

PLATE X.

FIG. 1. Typical Mangyan clearing already planted. (Photograph by Miller.)

2. Rattan bridge built by Mangyans across Amnai River, near Sablayan, Mindoro. (Photograph by Martin.)

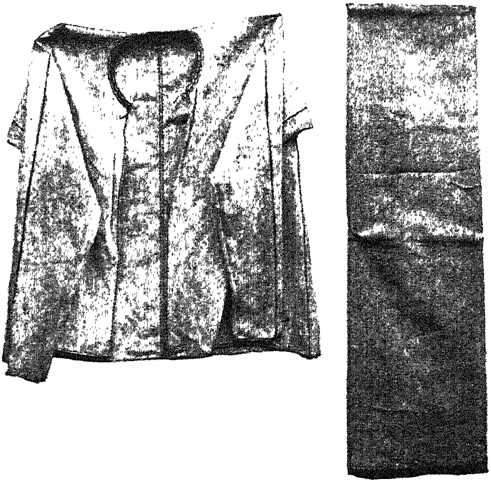

Fig. 1. Jacket and loin cloth.

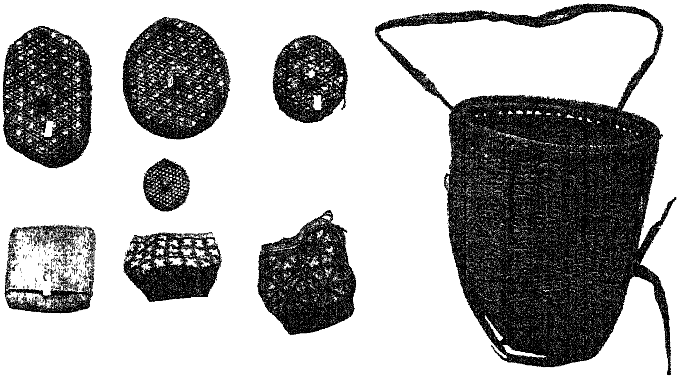

Fig. 2. Mangyan baskets.

PLATE V.

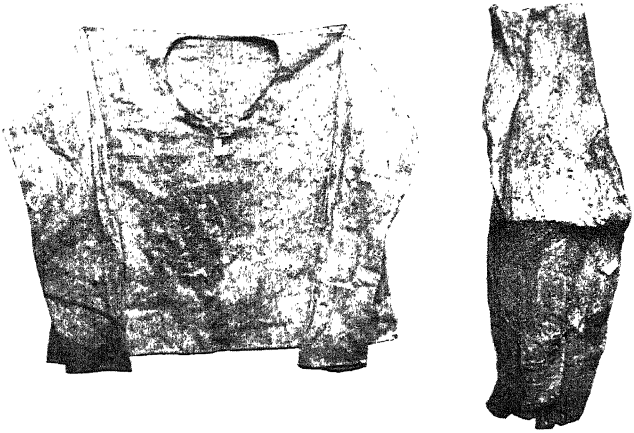

Fig. 1. Jacket and loin cloth.

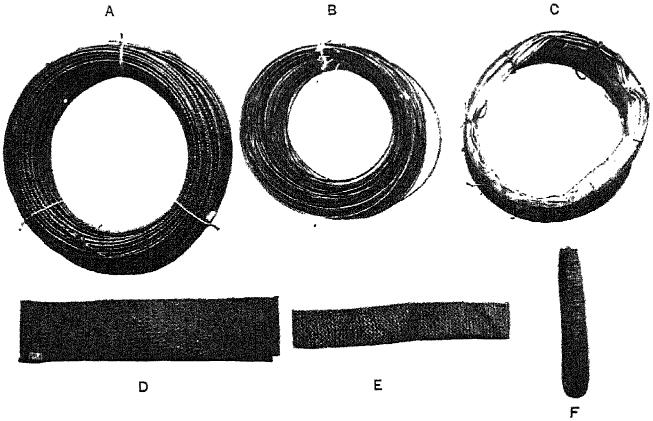

Fig. 2. Articles of dress made of buri, nito, and bamboo fiber.

PLATE VI.

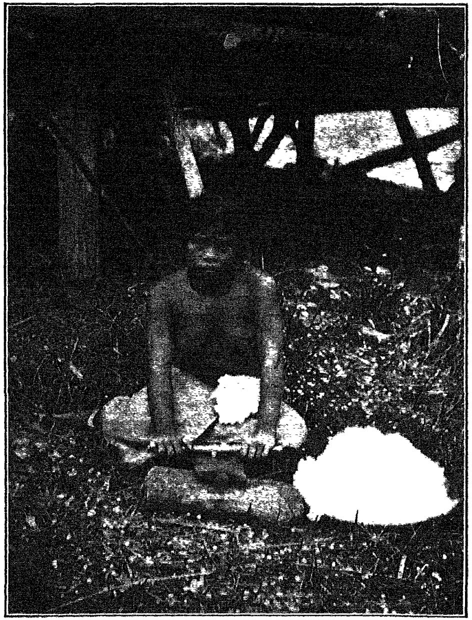

Fig. 1. Rolling seeds from cotton fiber.

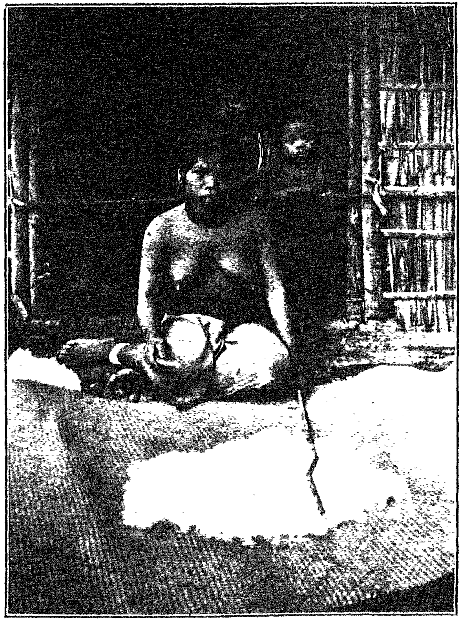

Fig. 2. Beating cotton fiber.

PLATE VII.

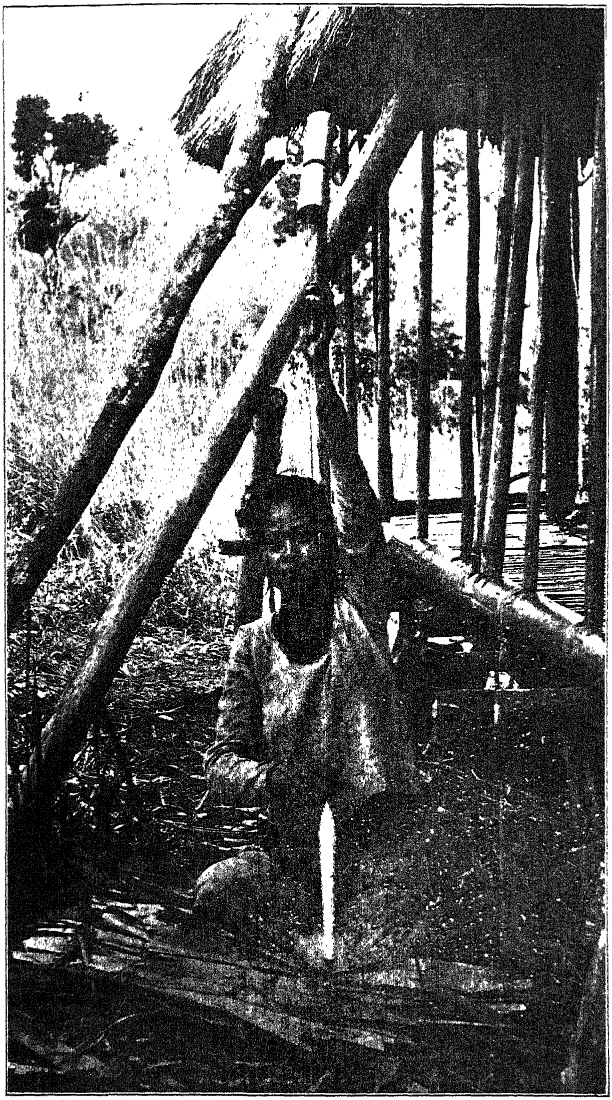

PLATE VIII. MANGYAN WOMAN, NEAR BULALAKAO, SPINNING COTTON THREAD.

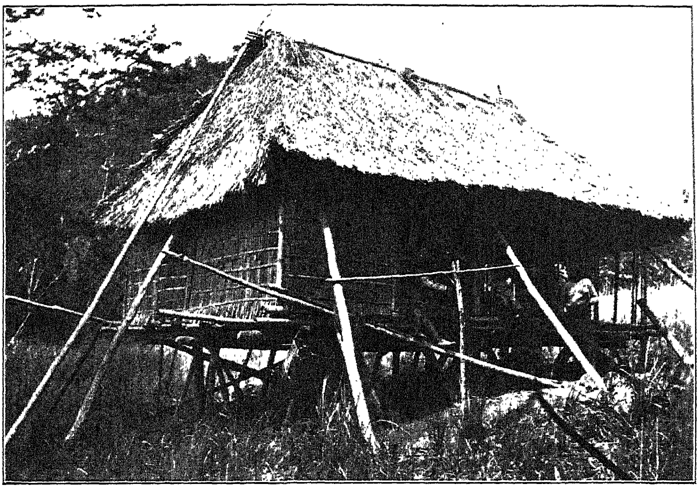

Fig. 1. Mangyan house near Bulalakao.

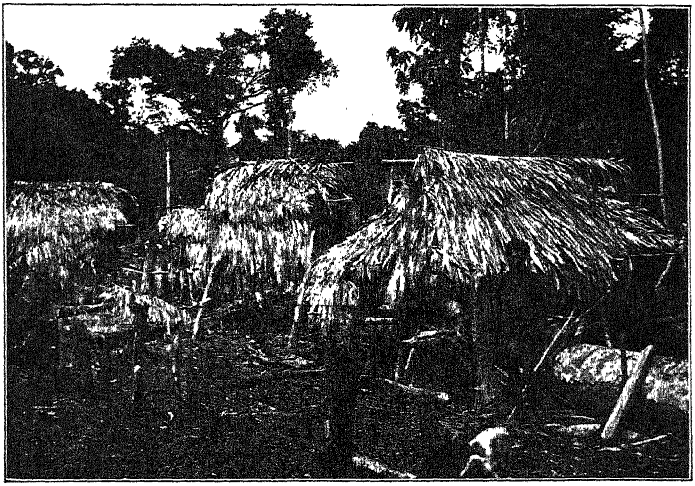

Fig. 2. Mangyan houses, Bako River.

PLATE IX.

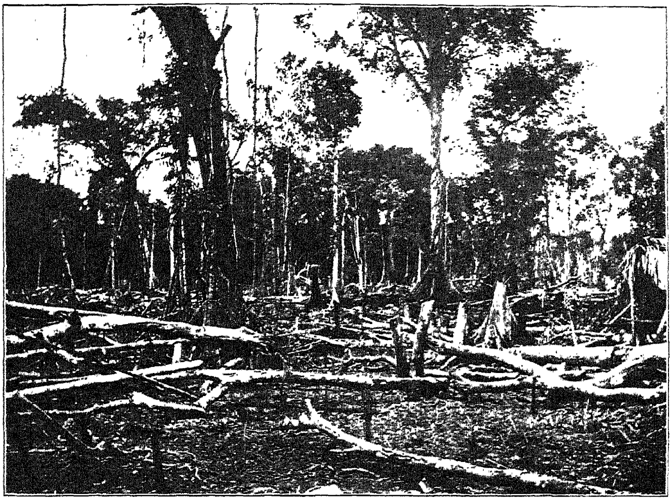

Fig. 1. Typical Mangyan clearing already planted.

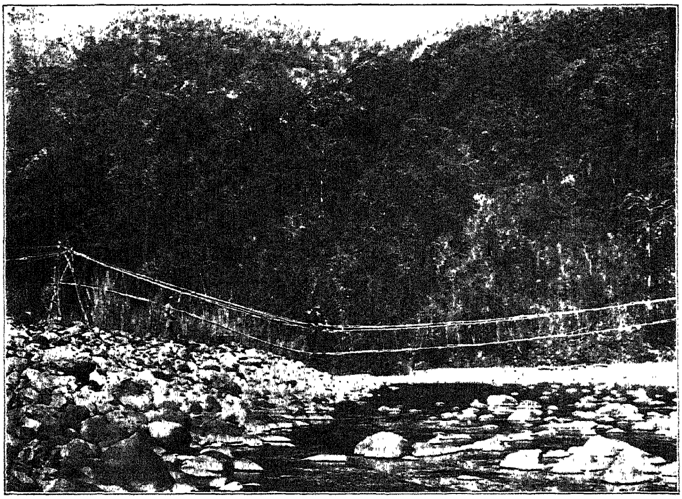

Fig. 2. Rattan bridge built by Mangyans, near Sablayan.

PLATE X.

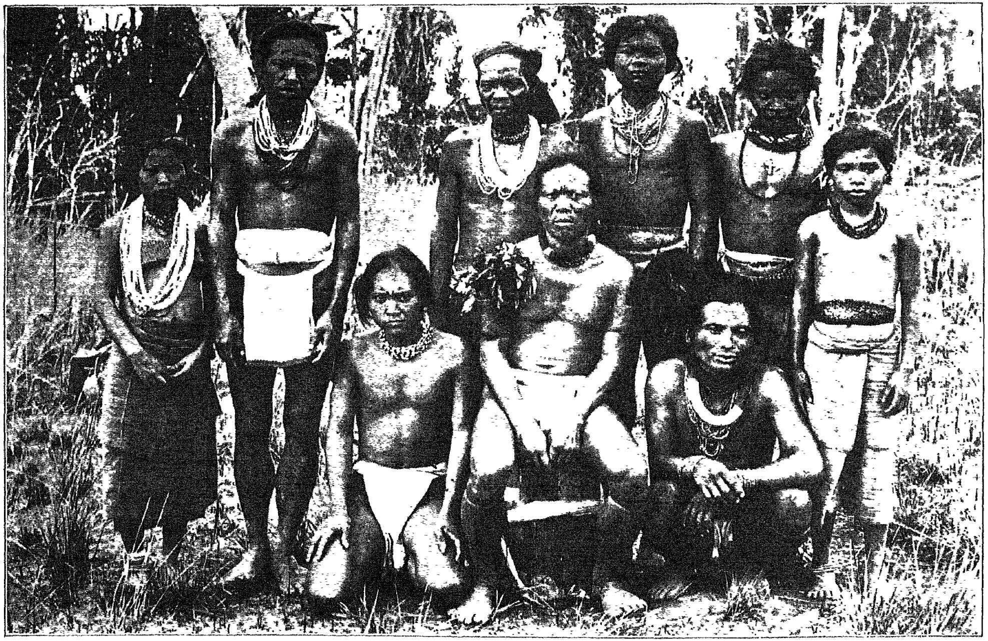

PLATE I. MANGYAN MEN AND GIRLS, NEAR BULALAKAO.

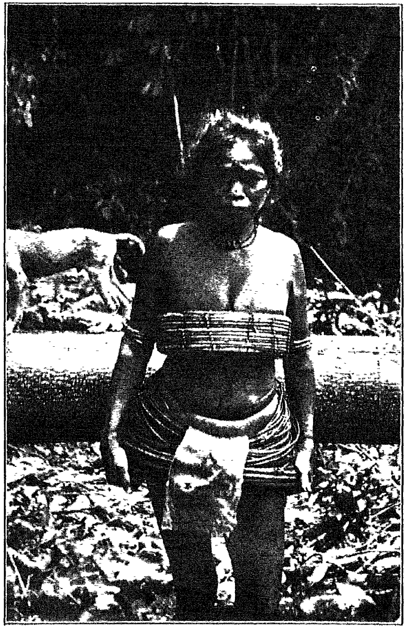

Fig. 1.

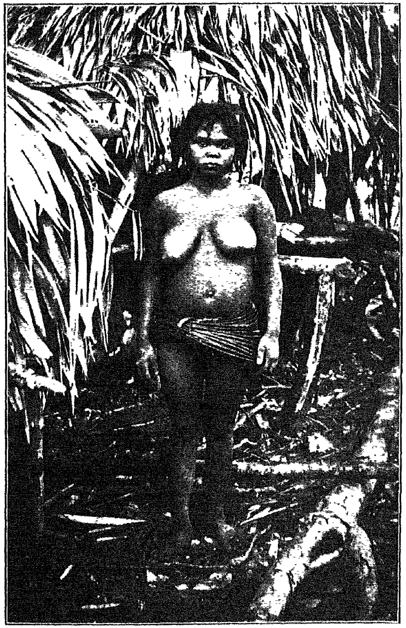

Fig. 2.

PLATE IV. MANGYAN WOMEN OF THE BAKO RIVER.

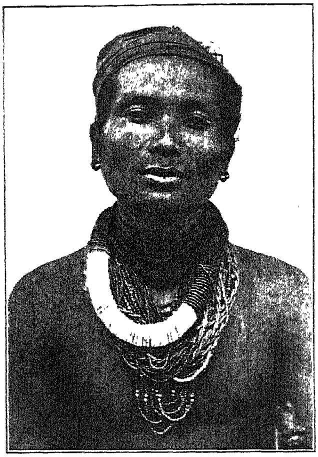

Fig. 1.

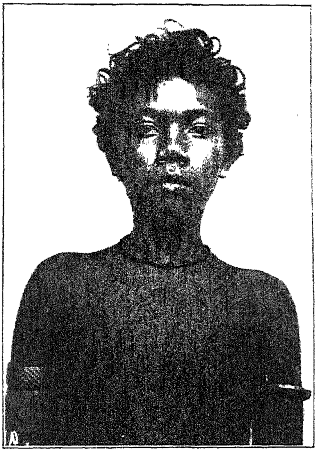

Fig. 2.

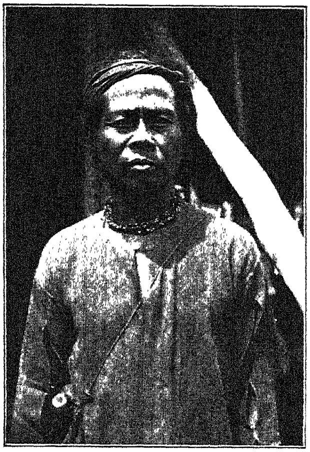

Fig. 3

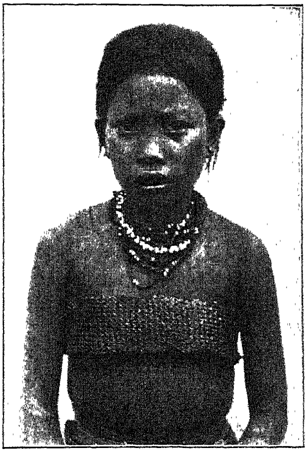

Fig. 4.

PLATE II. MANGYANS OF THE BAKO RIVER AND OF BULALAKAO.

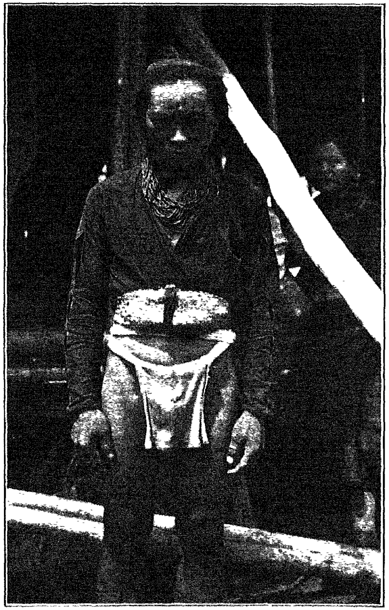

Fig. 1. Mangyan man, near Bulalakao.

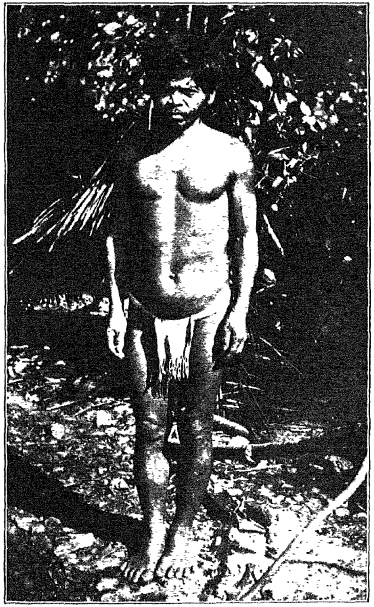

Fig. 2. Mangyan man, near Abra de Ilog.

PLATE III.

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D. General Biology, Ethnology and Anthropology.
Vol. VII, No. 3, June, 1912.

NOTES ON THE MANGYAN LANGUAGE.

By E. E. SCHNEIDER.
(From the Bureau of Forestry, Manila, P. I.)

The following vocabularies were collected by Doctor Miller in three different regions of Mindoro: Bulalakao, Abra de Ilog, and Nauhan.* The Mangyans of Bulalakao live among the foothills some distance inland from the town; those of Abra de Ilog scattered about the basin of the Ilog or Tuai River; and those of Nauhan on the shores of Lake Nauhan, some 15 to 25 kilometers from the town of the same name. Doctor Miller's interpreter was a Tagalog, a native of Bulalakao, who possessed a good working knowledge of English. With the exception of a few errors, which are commented on in the notes, I believe this list may be relied on as representing correctly the speech of those Mangyans among whom they were collected.

However, it should be noted that there is perhaps an unduly strong element of Tagalog of recent introduction in the Abra de Ilog collection. This is seen most strongly in the numerals, which are practically pure Tagalog throughout, even to the compound words, which latter in the Bulalakao dialect are formed on a system somewhat different from Tagalog, Bikol, and Bisaya. Other instances of Abra de Ilog forms identical with Tagalog, or practically so, while the other two dialects are different, will be found under abdomen, cotton, foot, left, mountain (?), and, in addition to these native words, the corrupt Tag.-Span. *baraso* (Span. *brazo*, arm). It would be strange if one of the Mangyan dialects had exactly the same numerals as Tagalog, but they are the very words that are first picked up in commercial intercourse. Doctor Miller informs me that the Mangyans of Abra de Ilog have probably come more into contact with the Tagalogs than those of any other region.

For convenience of reference, the English words have been arranged in alphabetical order, except the numerals and the names of the individual fingers, the former being given in order at the end of the list and the latter being made to follow the generic term finger. After each English word, those of the three Mangyan dialects are given in the following order: a, Bulalakao; b, Abra de Ilog; c, Nauhan.

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* This number, p. 135.

The spelling of the Mangyan words, as well as of those from other languages collected by me directly, is strictly phonetic, the following rules being observed:

a, e, i, o, u have the Latin or "continental" value. (Long and short vowels are not distinguished, except in Ifugao, where short vowels are marked with a circumflex accent.)

ö, similar to, if not identical with, Germ. *ö*, or Eng. *e* in *her;* it occurs in a few Mangyan words and has been substituted in this paper for E as used by Christie[1] in Subanun.

b, d, f, h, j, k, l, m, n, p, r, s, t, v, z as in English.

g, always hard, as in *get.*

n͠g as in *ringing;* where used without the tilde, *n* and *g* are pronounced separately, as in *ingrate.*

n͠gg as *ng* in *finger.*

ch as in *church.*

w as in *water;* used only at the beginning of a word or a syllable.

x as Germ. *ch* in *loch.*

y as in *yard;* used only at the beginning of a word or a syllable.

The apostrophe (') represents the glottal check, or *hamzat,* (Germ. *Kehlkopfexplosiva*). It will be noticed it does not occur in any Mangyan word here recorded; it undoubtedly exists in the language, but if present in any of the words collected, Doctor Miller did not observe it.

c and qu are not used, being replaced by k.

In order to avoid the confusion incident to citing material written in as many orthographic systems as there are authors, I have reduced all words to the above system, except in doubtful cases wher there seemed to be some risk of misrepresenting a word whose true pronunciation I could not learn. Also, in the cases of words like *apúi, bábui,* etc., which are found with the endings *-ui, -uy, -oi* and *-oy,* and *ólo* or *úlu,* in which is found every possible combination of *o* and *u,* I have unified the different spellings to avoid the endless repetition of practically identical forms. This seems to me unobjectionable both because it is well known that *o* and *u* are frequently interchangeable even within very limited localities and because the majority of writers have been notoriously careless in the use of these two letters.

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[1] *Pub. P. I. Bur. Sci., Div. Ethnol.* (1909), 4, 107.

As the main object of the compilation is to show the probable nearer or more remote relation of Mangyan to the other Philippine languages, forms not closely resembling the Mangyan have as a rule been cited only where no nearly identical ones were found. In cases where no English equivalents are given for the cognate words cited, these are synonymous with the Mangyan, cognate terms not synonymous with Mangyan being followed by English explanations.

In the case of the numerals it has not seemed worth while to collate a mass of material; they are, therefore, simply tabulated, with a few notes in individual cases.[2] No numerals were collected in the Nauhan dialect.

LANGUAGES AND DIALECTS CITED,[3] ABBREVIATIONS OF THEIR NAMES, AND AUTHORITIES CITED.[4]

Ae.-Bat.[5]	Aëta of Bataan.	Reed, W. A., Negritos of Zambales. *Pub. Phil. Ethnol. Surv.* (1905), 2, pt. I.
Ae.-SF.	Aëta of Sta. Fe, Zambales.	
Ae.-Sub.	Aëta of Subig, Zambales.	

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[2] An excellent table of numerals in Philippine languages is given by Scheerer, The Batan Dialect, following p. 88. *Pub. P. I. Bur. Sci., Div. Ethnol.* (1908), 4, pt. I.

[3] Besides acknowledging sources from which the word lists are derived, I desire here to express my thanks to Doctor Miller and to Messrs. Scheerer and Beyer for various corrections and suggestions made by them while the manuscript was in preparation.

[4] The spelling of the names (except Ibanak and Ifugao) follows the list proposed by Conant [The Names of Philippine Languages, *Anthropos*, (1909), 4, No. 5, 6], which has been adopted by the division of ethnology of the Bureau of Science.

[5] It should be kept in mind that all Aeta (i. e., Negrito) dialects so far observed in the Philippines are of Indonesian origin; that is, the Aeta have everywhere adopted the languages of the tribes that surround them. It is quite probable that they have sometimes preserved antiquated forms and in some cases a tribe of Aeta may even have learned their speech from earlier Malayan invaders than those who now surround them. A modern instance of this was suggested to me by Mr. Scheerer: The Aeta of Zambales speak a corrupt Sambali, but Sambali is being supplanted by Iloko, Pangasinan, and Tagalog (see Reed, *op. cit.*, pp. 27, 28). When Sambali becomes obsolete in the plains, which it almost certainly will long before it does in the hills, the Aeta will be speaking an otherwise lost language. Moreover, it is quite certain that each Philippine language, where adopted by the Aeta, has suffered a considerable number of changes in pronunciation and even of inflection, but it remains essentially Indonesian. It is not, of course, impossible that original Aeta words may have survived occasionally, for instance in topographical names and names of plants.

Ban.	Banawi. Schadenberg, A., cited by Scheerer, O. The Batán Dialect, etc. *Pub. P. I. Bur. Sci., Div. Ethnol.* (1908), 4, pt. I.
Bgb.	Bagobo. Gisbert, M. Diccionario español-bagobo, cited by Scheerer. Some words from the same source added by J. M. Garvan.
Bis.-A. Bis.-M.	Bisaya of Agusan Valley. Bisaya of Mindanao. Furnished me by Mr. J. M. Garvan, of the division of ethnology, Bureau of Science, who has spent several years among the pagan tribes of eastern Mindanao. The first of these dialects is that spoken by the Christian Bisaya settlers in the Agusan Valley and the second the Bisaya spoken (with many local dialectic variations) throughout eastern Mindanao.
Bis.-I. Bis.-L.	Bisaya of Iloilo. Bisaya of Leyte. From an intelligent domestic servant, a native of Leyte, apparently well acquainted with both dialects.
Bkl.	Bikol. From my own notes on this language.
Bkl. L.	Bikol. Lisboa, Márcos de. Vocabulario de la Lengua Bicol.[6]
Bnu.	Banuáon. A tribe distinct from the Manobo, presumably identical with the Bukidnon of Bukidnon Subprovince, Agusan Province. Its habitat is in the mountains west of the lower part of the Agusan River, in Butuan Subprovince, Agusan Province. Words furnished by Mr. J. M. Garvan. (See Bis.- A.)
Bon. C.	Bontok Igorot. Clapp, W. C. A Vocabulary of the Igorot Language, etc. *Pub. P. I. Bur. Sci., Div. Ethnol.* (1908), 5, pt. III.
Bon. J.	Bontok Igorot. Jenks, A. E. The Bontoc Igorot. *Pub. Phil. Ethnol. Surv.* (1905), 1.
Bon. S.	Bontok Igorot. Schadenberg, cited by Scheerer.
Btn.	Batan. Scheerer, *op. cit.*

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[6] I have so distinguished between modern Bikol words and those taken from Lisboa because his dictionary, though first published in 1754, was written about 1590 to 1620, and forms found in it, though now perhaps antiquated or even obsolete, are for that very reason of greater interest. In this connection it should be remarked that not too much weight should be given to the fact that there is so large a Bikol element in the following notes. Merely to look up synonyms is easy in any book of reference, even though one have but little knowledge of the language in question, but the compilation of cognate terms having often quite different meanings is comparatively difficult except in a language with which one is fairly well acquainted.

Dmg.	Dumagat of Bulakan. Simon, E. J. Manuscript of the Ethnological Survey, cited by Reed.
Form.	Formosan, cited by Scheerer.
Gin. M.	Ginaan. Meyer, H., cited by Scheerer.
Gin. S.	Ginaan. Schadenberg, cited by Scheerer.
Ibk.	Ibanak.[7] Most of the material in this language was furnished me by Mr. Valentin P. Franco, of the Bureau of Forestry, a native of Aparri, Kagayan; some words are from Scheerer, and a few from Nolasco de Medio, P. Fr. Pedro, Gramatica Ibanag-Castellana.
Ifg.	Ifugao. Furnished by Mr. H. Otley Beyer, division of ethnology, Bureau of Science.[8]
Sub-Ifg.	Sub-Ifugao.

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[7] This name is given as Ibanag (abbrev. Ibg.) by Conant, but it is pronounced Ibanak. The reason for this seeming inconsistency is that in this language all original final sonants are pronounced surd, resuming their original value only when a suffix is added. That is, when the compound analogous to *katagalugan,* from *tagalog,* is formed from *ibanak,* it becomes *keb-banag-an.* It seems to me more logical to spell each form as actually pronounced, than to use a spelling that necessitates the constant keeping in mind of a phonetic rule in order to pronounce correctly the written word.

[8] Ifugao is not a native tribal name. It is the name by which the people are known to the Ibanak tribes of Nueva Vizcaya and Isabela Provinces. It is now applied to all the clans, some 60 in number, that inhabit the Ifugao Subprovince of the Mountain Province. Formerly they called themselves by their clan-names, but they have now learned to call themselves Ifugao, though they pronounce it Ipúgo or Ipúgao. They understand it to mean "fair-complexioned." This is confirmed by comparison with the following terms: Ilk. *púdau,* white; Ibk. *fúrau,* white; Bkl. L. *pórao,* white cloth or clothes; Bkl. *púrau,* abaka cloth with no admixture of cotton or silk; Sbn. *púlau,* white abaka cloth; Ting. *napudau,* white; Bon. J. *impókau,* white; Bon. C. *enpokau,* white; Bon. C. *pulau,* Spanish, Spaniard; Bon. C. *pomokau-ak,* to be clear; Bon. C. *papokawek,* to clean, make white; Ifg. *ipúgo, ipúgao;* Sub-Ifg. *ipúko, ipúkao,* fair (of complexion) and a variety of white rice.

If we add to this the significant fact that the Ifugao are rather fair, while their neighbors, the Ibanak, are the darkest-skinned of all Filipinos, it seems rather probable that this is the true origin of the name. It was first applied to the whole tribe by P. Buenaventura Campa, Los Mayóyaos y la Raza Ifugao. Madrid (1895).

Ifugao is the language of the Kiangan-Ifugao, Western-Ifugao, and Central-Ifugao Districts; *Sub-Ifugao,* of the Mayaoyao and Alimit Districts. The latter differs from pure Ifugao essentially in its phonetic system.

The name is given by Conant as *Ifugau,* but I am informed by Mr. Beyer, who is my authority for the above facts, that the final sound is a distinct *o,* the *a* and *o* being pronounced clearly and almost separately.

Ilk.	Iloko. Furnished mostly by Mr. Valentin P. Franco, with the assistance of a native of Ilocos; a number of words cited from Scheerer.
IN.	Indonesian.
Inb.	Inibaloi. Scheerer, O. The Nabaloi Dialect. *Pub. Phil. Ethnol. Surv.* (1905), 2, pt. II.[9]
Klm.	Kalamian. Jerónimo de la Virgen de Monserrate. Vocabulario castellano-calamiano. MS. de 1789. (Retana, Archivo II), cited by Scheerer.
Knk.	Kankanai. Lagasca, Mariano. Manuscript, cited by Scheerer.
Lep.	Lepanto, Igorot of. Schadenberg, A., cited by Scheerer.
Mal.	Malay. From various random notes in my possession.
Mda.	Mandaya. Furnished by Mr. J. M. Garvan.
Mgd.	Magindanao. Juanmarti, J. Diccionario moro-magindanao-español, cited by Scheerer.
Mgy.	Mangyan.
Mnb.	Manobo. Furnished by Mr. J. M. Garvan.
Pamp.	Pampanga. Furnished me by Mr. Luther Parker, of the Bureau of Education, partly from his own notes, partly from: Bergaño, D. Vocabulario de la lengua pampanga. The same gentleman called to my attention certain words from Wallace, A. R. The Malay Archipelago.
Pan.	Panay, Bisaya of. Lozano, R. Cursos de la lengua panayana, cited by Scheerer.
Pang.	Pangasinan. Macaraeg, A. A. Vocabulario castellano-pangasinan; and Pellicer, M. Arte de la lengua pangasinan, both cited by Scheerer.
Phil.	Philippine.
Sbl.	Sambali.[10] Furnished me by Mr. Tranquilino Elicaño, a Sambali from Masinlok, Zambales, at present completing the fourth year in the Manila High School.

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[9] For the change from "Nabaloi" to "Inibaloi," see Scheerer, Batan Dialect, p. 15.

[10] This name is not included in the list of proposed spellings (Conant, *op. cit.*). In another publication [The RGH Law in Phil. Languages, *Journ. Am. Oriental Soc.* (1910–11), 31, pt. 1, 70 and 81] Conant gives "Sambal" abbreviated Sbl.); the name of the people and of the language is Sambáli.

Sbl.-Ae.	Sambali-Aeta.	Reed, *op. cit.*
Sbl.-Bol.	Sambali of Bolinao.	
Sbl.-Iba.	Sambali of Iba.	
Sbn.	Subanun, Sindangan River.	Christie, E. B. The Subanuns of Sindangan Bay. *Pub. P. I. Bur. Sci., Div. Ethnol.* (1909), 6, pt. I.
Sbn.-Dum.	Subanun, Dumankilas Bay.	
Sbn.-NR.	Subanun, Nueva Reus.	
Sub-Ifg.	*See* Ifg.	
Sul.	Sulu.	Haynes, J. H. English, Sulu and Malay Vocabulary. *Journ. Straits Branch R. A. S.* (1885), No. 16, cited by Scheerer.
Tag.	Tagalog.	Most of this material collected by myself, with the assistance of my family; some words from Scheerer.
Tiñg.	Tiñggian.	Meyer, H., cited by Scheerer.
Tir.	Tirurai.	Bennasar, G. Diccionario tiruray-español, cited by Scheerer.

The asterisk denotes theoretical forms.

WORD LIST.

1. **abdomen**; a, *áwak;* b, *pú-son;* c, *buñg-kó.*
   a: Bkl. *háwak*, body; Bis. *háwak*, waist; Bon. J. *áwak*, body; Mnb., Mda., Sbl. *áwak*, waist.
   b: Bkl. *pos'ón;* Bis.-A. *pós'on;* Ibk. *futúñg;* Ilk. *pus'óñg;* Bon. J. *fóto;* Bon. C. *poto;* Ifg. *pûtu;* Pamp, *púsu*, groin.
   c: No cognate material found.
2. **afternoon**; a, *ma-lam-búñg;* b, *gi-ra-pu-na-ní;* c, ———.
   a: Bkl. *imbúñg*, warmth (see also **hot**, **sun**); Sbn.-NR. *lálabuñg*, noon.
   b: Bkl., Bis.-I., Pang., Tag. *hápon;* Klm. *apon;* Bgb. *mapon;* Sbl. *ápon*, late afternoon; Pamp. *gatpanápon;* Bkl., Tag. *hápon*, to go to roost; Pamp. *ápon*, id.
   For the ending *-ani* see **sunset**, **yesterday**; it seems to have a sense of a definite point of time.
3. **arm**; a, *tak-yái;* b, *ba-rá-so;* c, *tak-yái.*
   a, c: Bkl., Ilk. *takyág;* Ibk. *takyák;* Ifg. *takláí* or *taklé;* Btn. *tachai;* Sbl. and Ae. *takiái;* Ae.-Bat. *tukiái;* Pamp. *tákdai.*
   b: Evidently only a corruption of Span. *brazo.*

The same form is found in Dr. John Francis Gemelli Careri's report of a voyage around the world, 1693–1697. (Reed *op. cit.*, p. 29, footnote.) Mr. Scheerer says: "The etymology is doubtless: *sañg*, particle denoting unity or totality + *bali* or *balei*, village," which I believe to be correct. The assimilation: *ñg* > *m* before a following labial is extremely common in many Philippine languages.

4. **arrow**; a, *ud-yún͠g;* b, ———; c, ———.

a: Pamp. *úyun͠g;* perhaps also the following: Bon. J. *kayyán͠g,* spear; Ifg. *gai'yan͠g,* spear; Bkl. *sugyán͠g,* sharpened bamboo stakes, "caltrops".

The native name of Orion, Bataan Prov., is Odyón͠g or Udyún͠g; there is a town named Odion͠gán in Tablas, a sitio of the same name in Sag̃nay, Camarines, and a river named Uyún͠gan in Montalban, Rizal.

5. **bad**; a, *da-út;* b, *da-ut;* c, *da-ut-laít.*

Bkl., Bis.-L. *ráot,* n., evil; Bis.-M., Mda. *dáut,* to harm; Bgb. *madát;* Bnu. *maláat;* Mnb. *madúut;* Bis.-A., Mda. *máat;* Sbn.-Dum. *ma-lat;* Dmg. *malót;* Sbl.-Bol. *marayét;* Sbl.-Ae., Ae.-SF., Ae.-Sub. *malayít.*

The third form is an interesting case of two cognate forms, probably no longer recognized as identical, being used to make an emphatic compound.

6. **bamboo**; a, *ka-wá-yan;* b, *ka-wá-yan;* c, *ka-wá-yan.*

Bkl., Bis., Bis.-A., Bnu., Mnb., Pamp., Tag., Sbl. *kawáian;* Ifg. *kawai'yan;* Bkl., Ilk., Tag. *wai,* rattan; Pamp. *áwai,* rattan.

The underlying idea in *kawaian* seems to be the same as in the Mal. name for bamboo, *rotang besar,* "big rattan." It may be though that both *wai* and *kawaian* are derived independently from a root *wai,* to sway. (Brandstetter, R. Gemeinindonesisch und Urindonesisch, p. 19.)

7. **banana**; a, b, *sagín;* c, ———.

Bis., Bis.-M., Bnu., Bon. J., Mda., Mbo., Pamp., Sbn., Tag. *ságin͠g.*

8. **bead**; a1, *pan-hó-gon;* a2, *úno;* b, *sa-lá-bai;* c, *maník.*

a1: Bis., Bis.-M., Bkl., Mnb., Tag. *tóhog, tóhug* or *túhug,* to string, whence * *pa-nohóg-on,* "objects to be strung"; Bkl. L. *totoghán* (*to-tohog-án* with elision of penult and metathesis of *h* and *g;* Bkl. has no final *h,* so *totohgán* would be inadmissible); Bis.-A., Bnu., Mnb. *tohogún;* Bkl. *torohogón* (*tohog* + pluralizing infix *r* and stemvowel + suffix *on*) any perforated objects that can be strung.

a2: Inb. *únno.*

b: No cognate material found.

c: Mal. *manik;* Tag. and prob. Sbl., *manikník,* various species of *Palaquium* and other genera of *Sapotaceae,* the brilliantly polished seeds of which are used as beads.

9. **bee**; a, *put-yú-kan;* b, *su-kán;* c, *tabún.*

a, b: Bgb., Bis., Bis.-M., Bkl., Mnb., Mda., Pamp., Pang. *potiókan;* Sbl. *pukiútan;* Bnu. *posíkan;* Bon. C. *yukan;* Ibk. *azzúkan;* Ilk. *uyúkan.*

?c: Sbn. *te-nöb,* honey, Mgd. *tanep.*

10. **black**; a, *ma-bí-ro;* b, *mai-túm;* c, *as-nun͠g-úno.*

a: Bgb. *bero,* soot; Bkl. L. *bíro,* soot or lamp black from smoke of pitch, used for making a kind of ink or paint; Mal., Semang, Sakai *biru,* blue.

b: Bgb., Bkl., *itóm,* black color; Bis., Bis.-M., Bnu., Mda., Mnb. *itúm;* Tag. *itím;* Sbn. *mitum.*

c: No cognate material found.

11. **bolo**;[11] a, *u-ták;* b, *pi-sáu;* c, *pi-sáu.*
    - a: Bis.-A., Bnu., Mnb. *uták,* broad-pointed bolo; Bkl., Tag. *iták;* Inb. *atak;* Ifg. *ó-tak.*
    - b: Sbn. *pes;* Mal. *pisáu.*
12. **bow**; a, *bá-yi;* b, *pa-na;* c, ———.
    - a: Bis., Bkl. *báhi',* palmwood; Ilk. *bá-i;* Pamp. *báyi;* Sbl. *báyi';* Bis.-M., Bnu., Mnb. *báhi',* fishtail palm; Mda. *bá-i,* id.
    - b: Bis., Bis.-M., Bkl., Bnu., Mda., Tag. *pána',* arrow; Sbn. *pana,* bow; Ifg., Pamp. *pána,* bow and arrow; Sbl. *pána,* arrow.
13. **breast** (*mamma*); a, *súsu;* b, *sú-su;* c, *ba-to.*
    - a, b: Ban., Bis., Bis.-M., Bkl., Bnu., Bon. J., Ilk., Inb., Knk., Lep., Mda., Mgd., Mnb., Pamp., Sbl., Tag. *sóso,* (*súsu*), *sóso'.*
    - c: No cognate material found.
14. **calf of leg**; a1, *ka-pus-gán;* a2, *arudan;* b, *bör-rös;* c, *tin͠g-tin͠g.*
    - ?a1: Bon. C., *fitkin.*
    - a2: No cognate material found.
    - b: No cognate material found, unless *börrös* be a variant of *bitís* (see under **foot**), which seems scarcely probable.
    - c: Btn. *alten͠g,* leg; Form. *tintin, tin͠gtin͠g,* foot; Pamp, *tintinbutit.*
15. **carabao**; a, *karabáu;* b, *a-nuán͠g;* c, *a-nuan͠g.*
    - a: Bnu., Mda., Tag. *kalabáu;* Bis. *karabáu;* Bis.-A. *kábau;* Mnb. *kiábau.*
    - b, c: Bon. C., Ibk., Ilk. *nuán͠g;* Bon. J. *noán͠g;* Ifg. *náan͠g;* Bkl. L. (now apparently obsolete) *anuán͠g.*
16. **carry**; a, ———; b, *mag-ba-bá;* c, ———.
    - Bis.-M., Bkl., Bnu., Mda., Mnb., Pamp., Tag. *babá* or *bába,* to carry on the back.
17. **cat**; a, *ku-tí;* b, *mú-nin͠g;* c, *pú-sa.*
    - a: Bis., Pamp., Sbn.-Dum. *kutín͠g;* Bkl., Sbl., Tag. *kutín͠g,* kitten; Inb. *kúting nan púsa,* kitten; Ibk. *kitáu;* Ibk. (Pamplona) *kusá;* Bis.-M., Mda. *kudín͠g;* Bkl. *ikús,* vocative *kus.*
    - b: No closely cognate form found, but it seems not improbable that *múnin͠g* is a variant of some form of the widely distributed IN root from which both a and c are derived.
    - c: Ilk., Pamp. *púsa;* Sbl., Tag. *púsa';* Ifg. *púha.* (Ifg. regularly has *h* for gen. Phil. *s.*)
18. **chest**; a, *dub-dúb;* b, *so-ót;* c, *ta-lam-ban͠g-án.*
    - a: Ae.-Bat., Ae.-Sub. *dubdub;* Bis.-M., Mda. *dubdub,* stomach; Sbn. *gögdöb le-e,* breast of man, *dub-dub li-bun,* of woman; Sub.-NR. *e-dob,* breast; Sub.-Dum. *gödöb;* Tag. *dibdíb;* Dmg. *dibdíb;* Ifg. *dîbdîb,* wind.
    - b: Perh. Inb. *sosot,* intestines.
    - c: No cognate material found, unless: Bkl. L. *lambón͠g* or *yambón͠g,* tunic; the *o* being unaccented might be assimilated to the preceding and following *a*'s; other instances of parts of the body named after things worn on them are: Bkl. *bahág,* loincloth, *pagbahágan,* waist; Bkl. L. *botók,* bracelet, *bobotkán,* wrist; Bkl. *híkau,* earring, *hikauán,* earlobe.

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[11] The current Spanish name, adopted by all other foreigners, for "bush knife," "machete"; no dictionary I have seen gives any explanation of it. Perhaps it is a Spanish corruption of Tag. and Bkl. *gólok* or *gúluk,* the ordinary working bolo.

19. **child**; a, *a-nák;* b, *un͠g-á;* c, *un͠g-á.*
 a: Bis., Bis.-M., Bnu., Bon. C., Ilk., Mda., Mnb., Pamp., Sbl., Tag. *anák*, son, daughter; Ifg. *nak*, id.; Ibk. *aná*$^{'k}$, id.; Bkl. L. *anák*, unborn young of carabao.
 b, c: Bon. C. *on͠gon͠ga*, children; Bon. J. *on͠gon͠ga*, child; Ifg. *ón͠ga*, child, *on͠gón͠ga*, children.

20. **coat**; a, *ba-lu-kás;* b, ———; c, ———.
 Igt. of Balangao (Jenks, p. 155) *balákas*, breech cloth; Inb. *balikes*, belt; Ilk. *baríkes*, belt. (See also material under **pocket belt.**)

21. **coconut**; a, *ni-úg;* b, *ni-úg;* c, *ni-úg.*
 Bis.-M., Bkl., Ilk., Mda., Mnb., Sbl., Sbn., Tag. *nióg* or *niúg;* Ifg. *núug;* Sub.-Ifg. *líyug;* Ibk. *niúk*, Bnu. *nidiúg.*

22. **cold**; a, *ma-ra-míg;* b, *ma-dim-la-a-ni;* c, *ma-lamig.*
 a, c: Bis., Klm., Tag. *malamíg*, Ilk. *nalam'ék, lammín;* Ibk. *lummín.*
 b: Pamp. *dímla*, n., *marímla*, adj., cold.

The second form is probably from the same grundwort as the other two; one of the peculiarities of Pamp. is the frequent occurrence of metathetic forms.

Judging from the ending *-ani* (see remark under **afternoon**) *madimlaani* perhaps means not "cold," but "cold season" or "the coolest hour (of the night)."

23. **cook, to**; a, ———; b, *man͠g-apui;* c, ———.
 Ibk. *magafuí*, to cook rice; Ilk. *agapúi*, id. (See **fire.**)

24. **cotton**; a, *bú-rak;* b, *si-nú-lid;* c, ———.
 a: Bis., Pamp., Tag. *búlak.*
 b: Pamp. *súlad*, thread, *sinúlad*, cotton thread; Tag. *súlid*, to twist, *sinúlid*, cotton thread; Ifg. *hînúlit*, fine thread.

It is probable that there was between the Mangyan and the interpreter a confusion of the article "thread" with the material "cotton," as it seems scarcely probable that the word for "cotton" should not exist in any given Phil. language or dialect.

25. **day**; a, *si-rán͠g;* b, *aldáu;* c, *a-rau.*
 a: Bkl. *síran͠g*, to shine, to rise, *sirán͠gan*, east, orient; Tag. *sílang, silán͠gan*, id.; Pamp. *aslag*, to shine, *sinlag*, shone. (See also **to-day.**)
 b, c: Bkl., Ilk., Pamp. *aldáu;* Bis., *adláu;* Bis.-M. *ádlau;* Bnu. *ádau;* Mnb. *ädau* (Germ. *ä*); Mda. *állau;* Ibk. *ággau;* Ifg. *álgo;* Sbl. *áulo;* Tag. *árau.*

26. **dog**; a, *ido;* b, *idú;* c, *kitó.*
 Bis.-M., Bis., Mda. *ído;* Bis. *íro;* Bkl. *ído*, puppy; Tir. *itú;* Btn. *chito;* Ibk. *íto, kíto;* Klm. *kito;* Sbn. *gitu.*

27. **down**; a, *a-ba-bá;* b, *san͠g-a-tó;* c, *ta-tú.*
 a: Bis., Bkl., Ilk., Pamp., Tag. *babá* or *babá'*, down, go down, descend, put down, lower; Bnu., Mnb. *dibába*, to go downstream; Mda. *bába*, id.
 b, c: No cognate material found.

28. **ear**; a, *tu-lí;* b, *ta-lin͠g-á;* c, *ta-lin͠g-a.*
 a: Bkl., Ilk. *tulí*, earwax; Bgb. *túli*, id.; Tag. *tutulí*, id.; Bis. *atutulí*, id.; Sbl.-Bol. *totoryán;* Sbl.-Iba *totolyán;* Sbl.-Ae., Ae.-SF. *túli;* Bis.-M., Bnu., Mda., Mnb., *atúli.*

b, c: Bgb., Bis., Bkl., Dmg., Ibk., Sbn., *talíñga;* Bis.-M., Bgb., Ilk., Mda., Mnb. *talíñga*, lug, handle (*talíñga* has this as a secondary meaning in many other languages); Tag. *taíñga.*

29. **elbow**; a, *sé-ko;* b, *sí-ko;* c, *sí-ko.*

Bgb., Bis., Bis.-M., Bkl., Bnu., Bon., Ibk., Ilk., Lep., Mda., Mnb., Pamp., Pang., Tag. *síko* or *síko';* Ifg. *híku;* Sbl. *híko.*

30. **eye**; a, *matá;* b, *ma-tá;* c, *matá.*

Ae., Ban., Bgb., Bis., Bis.-M., Bnu., Bon. S. J. C., Gin. S., Ibk., Ifg., Ilk., Inb., Klm., Knk., Lep., Mda., Mgd., Mnb., Pamp., Pang., Sbl., Sul., Tag. *mata* or *mata'* (with variable accent); Gin. M., Tiñg. *ada;* Tir. *moto.*

31. **eyebrows**; a, *kid-són;* b, *ba-lis-kög;* c. *idúp.*

a: Bkl., Ibk., *kírai;* Bon. J. *kichí;* Bon. C. *kichoi;* Bis., Tag. *kílai;* Ifg. *kídi;* Sub-Ifg. *ichóm;* Smb. *kíloi;* Bis.-M., Bnu., Mda. *kîlái;* Mnb. *kilúi.*

b: Bkl. L. *bulakóg*, staring eyes; Bkl. L. *alisákog*, eyes blazing with anger.

c: Pamp. *írap*, eyelashes; Bkl. L. *kirapkírap*, to wink rapidly or frequently.

32. **eyelashes**; a, *ami-me-rúk;* b, *kí-rai;* c, *bul-bul.*

a: Bis. L. *amimilúk;* Bkl., Sbl. *piróк;* Tag. *pilík-matá.*

b: See **eyebrows.**

c: Bkl., Tag. *bulbúl*, pubic hair; Bis. *bulbúl*, down, hair of the body; Tag. *bólo*, down of fruits; Pamp. *bulbúl*, pubescence, feather; Bis.-M. *búibúi*, pubic and axillary hair; Bgb., Bnu. *bulbúl*, hair; Mda. *búibúi*, id.; Mnb. *bobü* (Germ. *ü*), id.

33. **fall, to**; a, ———; b, *na-la-bo;* c. ———.

Pamp. *nábo'*, to throw down, overthrow; Sbl. *nábo';* Bgb. *gobbá;* Bkl. *gabá';* Ibk. *giván;* Ilk. *rebbá, gibáen;* Tag. *gibá';* Tir. *gɛbá, rebá;* Bis.-M., Bnu., Mda., Mnb. *gúba*, to destroy, to go to ruin.

34. **finger, toe**; a, *itu-to-ró;* b, *só-lo;* c, *su-lú.*

Bgb. *tintudo;* Bis. *tudló';* Bis.-M., Bnu., Mnb., *túdlo;* Bkl. *moró';* Bkl. L. *soló*, hoofs of cattle, sheep, etc.; Ilk. *tamudú*, index f.; Klm. *toldo;* Mda. *túllo;* Mgd. *tinduru;* Pamp. *turú;* Pang. *tamoró;* Sbn. *tunduh*, finger, index f.; Sbl. *tamoró'*, index f.; Tag. *hintutúro'*, id.

All of these forms are from a widely distributed grundwort *tudu*=*turu* which means primarily "to point," then "direct," "teach," "show," "instruct"; (See **index finger.**) For the change of initial *t* to *s* in b and c, compare Mgy. *sukán*, Ibk. *azzúkan* and Bnu. *posíkan* under **bee.**

35. **thumb**; a, *i-na-i-ná;* b, *pa-na-köl;* c, ———.

a: Bgb. *ina-iná*, godmother; Ban., Bkl., Bon. S. J. C., Btn., Gin. S., Ibk., Ilk., Inb., Klm., Knk., Lep., Mgd., Pang., Sul., Tag. *iná*, mother; hence (?) *inainá*, the "little mother" of the fingers; or (?) from Bkl. *ína'*, to diminish, the "diminished finger", as having one joint less than the others.

b: See **large.** Other names for thumb meaning "big finger" are: Bis. *kumalágko;* Bkl. *tindarákol;* Pamp. *tindarágul.*

36. **index finger**; a, *tu-tú-yau;* b, *pan-dó;* c, ———.
 a: Bis. *tóro';* Bkl. *toldó';* Pamp. *túru;* Tag. *hintutúro';* Ifg. *âmtúdu;* and other forms given under **finger**.
 b: Probably * *panudú* from grundwort *tudu.*

37. **middle finger**; a, *ma-na-lá-bau;* b, *labis na solo;* c, ———.
 a: Bis.-M., Bkl. *panlábau* < *lábau,* projecting, salient, exceeding, standing out (see *sakbáu* under **mountain**); Bnu. *ilalabáu;* Mda. *pan͠gukábau.*
 b: Bis., Tag. *lábis,* excess; Bkl. *labí,* id.

38. **ring finger**; a, *pa-ún͠g;* b, ———; c, ———.
 ? Bis. *panin͠gsin͠gan;* Pamp. *palsin͠gsin͠gan;* Bis., Bkl., Pamp., Tag. *sin͠gsín͠g,* ring.

39. **little finger**; a, *lan͠g-gi-gís;* b, *pa-na-gís;* c, ———.
 Bis. *kamalin͠gkín͠g;* Bkl. *gigís;* Bon. C. *ikikin͠g;* Ibk. *amikiki';* Ilk. *kikít;* Pamp., Tag. *kalin͠gkin͠gan;* Sbl. *tan͠gginíh;*[12] Bis.-M., Bnu., Mda., Mnb. *kin͠gkin͠g.*

40. **fire**; a, *apúi;* b, *apui;* c, *ba-ya.*
 a, b: Ae., Ban., Bgb., Bon. S. J. C., Gin. M. S., Ifg., Ilk., Inb., Klm., Knk., Lep., Mgd., Pang., Tag., Tin͠g. *apoi* or *apui* (with varied accent); Pamp. *apí;* Ibk. *afuí.*
 c: Bis., Bis.-M., Bgb. G., Bkl., Bnu., Mda., Mnb., Sbn., Tag. *bága,* ember, glowing coal; Pamp. *báya,* id.

41. **foot**; a, *rap-ráp-pa;* b, *pá-a;* c, *da-la-pa.*
 a, c: Ban., Bkl., Ifg., Ilk., Lep. *dapán* or *dápan,* sole; Bis.-I. *dapadapá,* id.; Bis.-L. *rapadapá,* id.; Ibk. *dápan͠g,* id.; Gin. S. *zapan;* Bon. S. C., Inb. *chapán;* Tin͠g. *dabán;* Form. *dapal* and *rapal;* Sbl. *palapá,* sole.
 b: Bgb., Sbn. *páa;* Tag. *paá;* Ae. and Sbl. (six dialects), Bis.-M., Bkl., Bnu., Mda., Mnb. *páa,* thigh.

42. **gabi**;[13] a, *gabi;* b, *gabi;* c, *bu-tíg.*
 a, b: Tag. *gábi;* Ifg. *ába, kába;* Ilk. *ába;* Bis. *gabí;* Ibk. *gábi'*^{t}; Bkl. *gábi, Alocasia* sp.
 c: Metathetic form of Ibk. *gabi'*^{t}? Bkl., beside *gábi,* has *bíga,* another species (or mere variety?) of the same genus; Lisboa gives *póka*=Tag. *makópa,* (*Eugenia javanica* Lam.).

43. **good**; a1, *ma-yad;* a2, *ma-hál;* b, *pi-á;* c1, *kap-yan;* c2, *a-tug.*
 ? a1: Bis.-I. *maáyo;* Bis.-M. *madayáu, marajáu;* Bnu. *madadiáu;* Mda. *madayáu, madaduáu;* Mnb. *madadáu;* Ifg. *maphôd.*
 a2: Bkl., Tag. *mahál,* dear, precious.

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[12] The final *h* in this word, it may not be superfluous to remark, does not stand for the glottal check, which throughout this paper is represented by ('); except in the region immediately about Sta. Cruz, Zambales, general Philippine *s* is weakened in Sbl. to *h,* somewhat less aspirated than *ch* in Germ. *loch* and *ich.*

[13] The Tag. name of the taro or poi-plant (*Colocasia antiquorum* Schott). It is applied, in Bkl. certainly and probably also in other languages, to other plants of the same family.

b1, c1: Bis. L. *maópai;* Ibk. *nafía;* Sub.-NR. *pia;* Pamp. *máyap, áyap, káyap,* goodness, *áppia, kápia,* nobility, wealth; *makáppia, áyap, káyap,* goodness, *áppia, kápia,* nobility, wealth; *makáppia,* good; Wallace, Malay Arch., p. 478: *pia, marape, mapiah, mapyia.*

c2: No cognate material found.

44. **hair**; a, *bu-húk;* b, *o-bók;* c, *a-bók.*

Bis., Bkl., Tag. *bóhok;* Ae.-Bat. *labúk;* Ibk. *vu'*^{k}; Ifg. *búuk;* Ilk. *boók.*

45. **hand**; a, *káman͠g;* b, *a-lí-ma;* c, *bak-wán.*

a: Bis., Bkl. *kamót;* Mda. *kamút;* Bkl. *kámot* to scratch; Tag. *kámit,* id; Tag. *kamái;* Ibk. *kámaṅ͠g;* Bkl. L. *kaman͠gkaman͠g,* to wave or flourish the arms; Mda. *kámaṅ͠g,* to get with the hand.

b: Bgb., Bon. S. J. C., Ibk., Ilk., Mgd., Pang. *líma* or *limá;* Ilk. *íma;* Inb. *dima;* Sul. *limah;* Bis.-M., Bnu. *alíma;* gen. Phil. *limá* five.

c: No cognate material found.

46. **he**; a, *si-á;* b, *si-á;* c, ———.

Bis., Bis.-M., Bkl., Bon. C., Mda., Tag. *siá;* Ifg. *hía;* Sbl. *hiá;* Ibk. *yáya.*

47. **head**; a, *ú-lo;* b, *ó-lo;* c, *ú-lu.*

Ae.-Bat., Ae. and Sbl. (5 dialects), Bgb., Bis., Bnu., Bon. S. J. C., Gin. M. S., Ibk., Ifg., Ilk. Lep., Mgd., Mnb., Pang., *ó-lo,* or *ú-lu;* Klm. *kolo;* Tir. *uleu;* Bis.-A., Bkl. L., Mda. *óo.*

48. **here**; a, *sí-tai;* b, *pa-ra-ói;* c, *in-dá.*

a: Ifg. *hîtú* (Ifg. *h*=gen. Phil. *s*); Ilk. *ditói;* Sbl. *ití;* Tag. *díto.*

? b: Inb. *chiai* (Inb. *ch*=gen. Phil. *d; paraói* may be *pa-daói*).

? c: Bon. C. *isna.*

The relations between the equivalents of "here," "there," and "yonder" in the various Philippine languages are very obscure and complex; only where the resemblance between two forms is extremely close, or where such differences as may exist are clearly explained by parallels in the same languages, is it safe to assume that two such forms are closely cognate.

49. **honey**; a, *dai-kút;* b, *dö-gös;* c, *de-kút.*

a, c: Bis., Bkl. *dokót,* to stick; Ifg. *dayákôt, dumíkôt,* sticky; Tag. *dikít,* to stick, *malagkít,* sticky; Bon. C. *enlan͠gkot,* sticky; Inb. *din͠gket,* honey; Bon. C. *nikot,* pitch; Ilk. *napigkít,* sticky; Ibk. *narakkó'*^{t}, id; Bkl. *maragkót,* rough (i. e., apparently sticky on account of not being smooth, like sand paper).

b: Bis.-L.-I. *dugús;* Bgb., Bnu., Mda., Mnb. *dúga.*

50. **hot**; a, *ma-i-nit;* b, *ma-i-bún͠g;* c, *ka-i-bún͠g.*

a: Bgb., Bis., Bkl., Tag. *ínit,* heat; Bon. C. *initek,* to heat; Ifg. *inítom,* id.; Snb.-NR. *minit;* Snb.-Dum. *mayanit.* (See also **sun.**)

b: Bkl. *imbún͠g,* warmth, to warm. (See also **afternoon.**)

51. **house**; a, *ba-lai;* b, *ba-lai;* c, *ba-lai.*

Bis., Ibk., Ilk., Klm., Lep. *bálai* or *balái;* Tag. *báhai;* Inb. *bálei;* Pamp. *bále, bálai;* Ifg. *bále;* Sbl. *balí;* Sbn.-NR *baley;* Btn. *vahai;* Bkl. *baláian,* watchman's hut in field; Pang. *bálei,* village.

52. **I**; a, *a-kó;* b, *a-kó;* c, *ba-ging-yák.*

a, b: Bis., Bis.-M., Bkl., Btn., Mda., Tag. *akó;* Pamp. *akú;* Bon. C. *saken;* Ilk., *siák;* Inb. *sikak;* Sbl. *síko.*

c: Ilk. *bagí,* human body. Hence *bagiñg-yák,* "body mine"?. But see also *kabutyak* under thou.

53. **kaiñgin;**[14] a, *tan-mán;* b, *a-ga-yúm;* c, *ga-más.*

a: Bis., Bkl. *tanóm,* plant, to plant; Ifg. *tánum,* to plant; Bis.-M., Bnu., Mda., Mnb. *tanúm,* id.; Tag. *taním,* id.; Pamp. *tánam,* to plant rice; Bon. C. *tanim,* plant, *maitamnan,* planting; Bkl. *tatamnán,* garden, plantation; Bis. *tanáman,* garden.

b: No cognate material found.

c: Bis.-M., *gas,* to clear land; Bnu., Mda., Mnb. *gayas;* id.; Bkl. L. *ganás, nasnás,* to clear a space for the purpose of felling bamboos or trees.

54. **knee**; a, *tu-ai-tú-ai;* b1, *dúlañg;* b2, *to-ol;* c, *utul.*

a, b2, c: Bis.-M., Mda. *túai-túai,* kneecap; Ibk. *túad;* Bis., Bkl. Tag. *tóhod* or *túhud;* Bis.-M. *tóhud;* Sbn. *takh-tuai;* Sbn.-Dum. *dulud;* Pamp. *tud;* Ifg. *túug;* Sbl. *toór;* Klm. *tood;* Tir. *etur;* Mda. *tóud,* kneecap; Bis.-I., Bis.-L., Bkl., Tag. *lohód* or *luhúd,* to kneel.

b1: Ibk. *dulúñg.*

55. **large**; a, *daká;* b, *la-kol-náu;* c, *tuñg-yán.*

a, b: Bgb. *dakól;* Bis. *dakó;* Bis.-A. *dakúa;* Bis.-M. *malagkú;* Bkl., Ifg. *dakól,* much, many; Bkl. *dakóla';* Bnu. *dagdági;* Ibk. *dakál;* Ilk. *dakkél;* Mnb. *dákï;* Pamp. *dakál,* much, *dagúl,* largeness; Sbl. *lakó,* much; Sul. *dakolah;* Tag. *dakíla',* great, grand; Bkl., Tag. *dagdág,* to increase, augment, add to.

? c: Mal. *tiñggi,* height; Dmg. *húñga,* large.

56. **left (side)**; a, *walá;* b, *ka-li-wá;* c, *tag-wa-lá.*

Bis., Bkl., Tag. *walá;* Tag. *kaliwá;* Bis.-M., Mda. *kawá;* Bnu. *kawalá;* Mnb. *kawä.*

57. **leg**; a, *ba-láñg-bañg;* b, *pa-nó-bo;* c, *bi-tís.*

a, b: No cognate material found.

c: Bis.-M., Bnu., Mda., Mnb. *bitíis,* calf; Bkl., Pamp. *bitís,* foot; Sbl. *bitíh,* lower leg; Tag. *binté',* calf; Sbn. N. R. *botis,* foot.

58. **loin cloth**; a, *ba-ág;* b, *ba-ái;* c, *a-bái.*

Bis., Bkl., Mnb., Tag. *bahág;* Ibk. *vag;* Ilk., Mda. *baág;* Bkl. *habái,* waist band (of skirt or trousers); Bkl. L. *sabái,* sash with purse at end for carrying gold-weights or other articles; Sbl. *lobái;* Mda. *ábai,* belt (usually beaded); Mnb. *hábai,* id.

59. **loom**; a, *hab-lún;* b, *bu-la-bu-la;* c, ———.

Bis.-L., Bis.-M., Bkl. *hábol,* weft, cloth, to weave, Bis.-L. *halablánan;* Bis.-M. *hablón;* Bkl. *habólán;* Mda. *ábol, ábui* > *ablón;* Mnb. *hábui* > *habión;* Ifg. *ábol,* to weave; Ilk. *pañgablán;* Sbl. *pañgabolán;* Tag. *hábit,* to weave; Tag. *hablón.*

60. **long**; a, *á-ba;* b, *ma-á-ba;* c, *ka-báñg.*

Bis., Bkl. *lába',* length, *halába',* long; Tag. *hába', mahába',* id.; Bis.-M., Mnb. *mahába;* Mda. *maába;* Pamp. *makába;* Sbn.-NR. *mayaba;* Sbl.-Iba. *mahibán;* Bkl. L. *yabáñg,* broad, spacious.

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[14] Tag., "a cultivated clearing," a term widely known and used in the Islands.

61. **man**; a, *la-lá-ki;* b, *la-la-ki;* c, *la-kí.*
Bis., Bis.-M., Bkl., Bon. J. C., Gin. M. S., Ibk., Ifg. Ilk., Knk., Lep., Pamp., Sbl., Tag., Tiñg., *laláki;* Bon. S., Pang. *láki;* Inb. *daxi.*

62. **milk**; a, *gá-tas;* b, *yá-tas;* c, *gá-tas.*
Bis., Bis.-M., Bkl., Bnu., Ilk., Mfa., Mnb., Pamp., Sbn., Tag. *gátas;* Bon. C., Inb. *kátas;* Ibk. *gattó'.*

63. **monkey**; a, *a-mó;* b, *amó;* c, *ba-kús.*
a, b: Bis., Bis.-M., Bkl., Bnu., Mda., Mnb. *amó';* Sul. *amok.*
c: Inb. *baxes;* Pamp. *bagis,* a monkey larger than a *bakulau;* Sbl. *bakó';* Mnb. *bakús,* a species of snake.

64. **moon**; a, *bú-lan;* b, *bu-lá-nun;* c, *bú-lan.*
Ban., Bgb., Bis., Bkl., Gin. S., Ifg., Ilk., Inb., Klm., Pamp., Pang., Sbn., Sbl.-Iba *búlan;* Sbl.-Bol. *búran;* Sbl.-Ae., Ae.-S. F. *búan;* Tag. *buán;* Ae.-Sub. *búyan;* Bkl. *bulánon,* adj., moonlit, moonlight.

65. **mountain**; a, *ban-túd;* b, *ól-nan;* c, *sak-báu.*
a: Bkl. *bantúd,* elevation, mound; Bkl. L. *bantód, pantúd,* id.; Inb. *chuntuk;* Ilk. *bantái;* Mnb. *úntud;* Pamp. *bínduk;* Tag. *búnduk.*
b: Pamp. *ólo,* headwaters; Tag. *úlo,* id. (see also **head**); Bis., Bkl. *ulúnan* or *ulnán,* pillow (i. e. head-place); Bis.-M., Mda. *únlan,* id.; Mda. *únan,* id.; Mnb. *úan,* id.; Pamp. *ulúnan,* id.; Tag. *únan,* id.
c: Bkl. *umbáu* (*uñgbáo,* Lisboa) head (on a measure of grain, etc.); *lábau,* projecting, salient, standing out or above; and the foll., all from Lisboa: *mábau,* to weave in the manner of corduroy; *takóbau,* to be high or tall, e. g. the load in a boat, the grass on the edge of a field; *taríbau* and *tíbau,* id. (See also **middle finger.**)

66. **mouth**; a, *bi-bíg;* b, *bí-bi;* c, *bi-bi.*
Bgb., Tag. *bibíg;* Ibk. *vivík,* lips; Ilk., Sbn.-Dum., Pan. *bibíg,* id.; Pang., Klm., Mgd. *bibil,* id.; Sbl. *bobói.*

67. **neck**; a, *li-úg;* b, *lo-ói;* c, *ta-láu.*
a, b: Bis., Bis.-M., Bkl., Mda., Mnb., *líog* or *líug;* Tag. *líig;* Sbl. *lóoi;* Ibk., Mgd. *lig;* Sbn. *lehg.*
c: Bkl. L. *tílau,* uvula; Bkl. *bakláu,* plaited rattan ferule on the "neck" of spear shafts, tool handles, etc.; Bkl. *bukláu,* goitre; Btn. *lagao;* Ibk. *bulláu,* throat; Ilk. *bukláu,* glutton; Inb. *bukdou;* Pang. *bekléo;* Sbl. *bukláu,* throat.

68. **night**; a, *ya-bí;* b, *mad-lúm;* c, *ya-bí.*
a, c: Bis., Tag. *gab'í;* Bis.-M. *gabíi;* Ifg. *lâbi,* dark; Ibk. *gaví;* Ilk. *rabíi;* Gin. S. *labii;* Lep., Knk., Pang., Tiñg. *labi;* Mda. *gábi, gabíla;* Sbl. *yabí.*
b: Bis., Bkl. *dulúm,* darkness; Bis.-A. *dum,* night, *madíggum,* dark; Bon. C. *maschöm;* Gin. S. *madschum;* Ifg. *mátdum;* Mnb. *madíggium,* dark, *madokílum,* night. (See also *madlumani* under **sunset.**[15])

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[15] For a discussion of this root, see Scheerer, Batan Dialect, WL 7 and 7a, and pp. 102–3.

69. **nose**; a, *irún͠g;* b, *o-rón͠g;* c, *n͠gú-lun͠g.*
Bis., Bis.-M., Mda., Tag. *ilón͠g* or *ilún͠g;* Bon. C. *örön͠g;* Bon. J. *ilín͠g;* Ifg. *ólon͠g;* Ibk. *igón͠g;* Ilk. *agón͠g;* Pamp. *árun͠g;* Sbl.-Ae., Ae.-S. F., Ae.-Sub. *balón͠go;* Bkl. *don͠gó';* Sbn. *soon͠g;* Mgd. *n͠girun͠g.*

70. **palm** (of the hand); a, *da-lú-kap;* b, *pá-lad;* c, *da-lu-káp.*
a, c: Ilk. *dakúlap;* Inb. *chalúkap;* Sbl. *dalúkap,* palm, sole.
b: Bis., Bis.-M., Bkl., Ifg., Pamp., Sbn., Tag. *pálad;* Mda. *pái-ad;* Ibk. *pálak.*

71. **pig**; a, *bá-bui;* b, *bá-bui;* c, *bá-bui.*
Bgb., Bis., Bis.-M., Bnu., Ifg., Ilk., Klm., Mda., Mgd., Mnb., Pang., Sbl., Sbn., Sul., Tag. *bábui* or *báboi;* Ibk. *bávui.*

72. **pocket-belt**; a, *hág-kos;* b, ———; c, ———.
Bkl. *hagkós* (fide Lisboa, also *harikós*), waist band, belt; Bkl. *likós,* circumference; Bkl. *iksán* (fide Lisboa, *katiksán*), waist; Bkl. *takós,* diameter (?); Bis. *bagkós,* belt; Bis.-M. *bágkus,* id.; Sbn. *bakös,* Bon. J. *wákis,* girdle; Bon. J. C. *akósan,* woman's girdle; Bon. C. *wakös,* woven bark girdle; Mnb. *bákus, bagákis,* belt; Bkl. *bugkús,* Tag. *bigkís,* tie (piece of cord rattan, etc., used for tying a bale or bundle); Bis.-M., Mda., Mnb. *búgkut,* to tie in a knot. (See also **coat.**)

73. **red**; a, *ma-ra-rá;* b, *ma-pu-lá;* c, *ka-dim-ba-hin.*
a: Bon., Ifg., Tin͠g. *dala,* blood; Ibk. *daga,* id.; Tir. *dara,* id.; Knk. *mandada;* Mgd. *mariga.*
b: Bis.-M. *mapuá;* Bis.-L. *mapurá;* Bis.-I., Bkl., Tag. *mapulá;* Mnb. *mapúya;* Sul. *polah.*
c: Bgb. *liba,* to dye; Bis. *limba,* red, to dye red; Ibk. *labba,* red; Mda., Mnb. *líba,* to dye red.

74. **rice**; a, *bi-nu-gás;* b, *bu-gás;* c, *bi-gás.*
Bkl., Lk., *bagás;* Ibk. *baggá';* Bis., Bis.-M., Mda., Sbn.-Dum. *bugás;* Sbn. *bogás;* Ifg. *bóga, bógax;* Sbl. *buyáh;* Bnu., Mnb. *dugás.* (See also *kabuksí* under **white.**)

75. **right**; a, *si-kón;* b, *pa-ma-lán͠g;* c, *tak-su-kún.*
a, b: Ban., Lep. *awan;* Ifg. *wáwan;* Btn., Pamp. *wanan;* Bgb., Mgd. *kawánan;* Tir. *kuonon;* Ilk. *kanáwan;* Tag. *kánan.*

In these forms appears the common stem *wan,* frequently with prefix *ka-;* Tag. *kan-,* Tir. *kuon-,* and Mgy. *-kon* or *-kun* are probably all contractions of this compound; Mgy., instead of a suffix *-an,* has made use of a prefix, with the addition, in the last form, of another prefix, *tak-.* This last is probably the same as *tag-* in *tagwala* (see **left**) the *g* being changed to *k* by the influence of the following *s.*

? b: Bis. I. *tádlun͠g.*

76. **river**; a, *sá-pa;* b1, *sá-lug;* b2, *sá-pa;* c, *li-bun͠g.*
a, b2: Bis., Bis.-M., Bkl., Tag. *sápa',* creek; Pamp. *sápa,* id.; Sbn. *sapa-sapa,* id.
b1: Bis., Pamp., Sbl., Tag. *ílog* or *ílug;* Ilk. *ílog,* creek; Bkl. *sálog;* Bkl. L. *ílog,* channel, *ílig,* to flow.
c: Ifg. *libôn͠g, lôbbôn͠g,* deep pool, lake, sea, ocean; Bkl., Sbl. *libtón͠g,* deep pool in river; Ifg. *lítin͠g,* water. See also *lubún͠g* under **water.**)

77. **rock**; a, *i-li;* b, *ba-to;* c, *ba-to.*
 a: Bkl. L. *il'í,* salt as hard as rock; Ilk. *dili;* ? Bis., Tag. *bantilis,* a kind of rock (Romualdez, Bis. Grammar, p. 128); Bkl. L. *bantíris,* rock (in poetry).
 b, c: Ae. and Sbl. (six dialects), Bis., Bnu., Ibk., Ifg., Inb., Mnb., Sbn., Tag. *bato* or *batu* (with var. acc.); Bis.-M., Mda., Sbl. *bató'.*

78. **run**; a, ———; b, *da-la-gán;* c, ———.
 Bis., Bkl., Tag. *dalágan;* Bis.-M., Bnu., Mda., Sul. *dágan;* Bis., Bkl., Pamp. *dálan,* path; Bis.-M., Sbl., Tag. *dáan,* path, road, to go, to pass; Ifg. *dálan,* path, *dumálan,* to walk; Bnu., Mda., Mnb. *dan, dáyan,* path. (See also **walk**.)
 Evidently a reduplicated form exactly parallel to Bis., Tag. *dalága,* Bkl. *darága,* Klm. *darala,* girl, from Mal. *dara,* Mgd. *raga.* [Conant, RGH Law, *Journ. Am. Oriental Soc.* (1910–11), 31, pt. 1, 74.]

79. **salt**; a, ———; b, *asin;* c, *asin.*
 Ban., Bgb., Bis., Bis.-M., Bnu., Bon. S. J. C., Gin. S., Ibk., Ilk., Inb., Knk., Lep., Mda., Mnb., Pamp., Pang., Sbl., Sbn., Sul., Tag. *asín* or *ásin;* Ifg. *ahîn.*

80. **sea**; a, *dá-gat;* b, *dá-gat;* c, *da-gat.*
 Bis. *dága';* Bkl., Bis.-M., Bnu., Mda., Mnb., Sbn.-NR., Sbn.-Dum., Tag. *dágat.*

81. **short**; a, *dag-úd;* b, *ka-bös-to;* c, *pon-dók.*
 ? a: Ifg. *hôh-dâd;* Pamp. *makúyad;* Sbl. *maantór* or *maantód.*
 b: No cognate material found.
 c: Bkl., Pamp., Sbl., Tag. *pandák,* short (i. e., not tall).

82. **sky**; a, *lan͠g-it;* b, *lán͠g-it;* c, *ki-wán͠g.*
 a, b: Pan., Bgb., Bis., Bis.-M., Bkl., Bnu., Ilk., Klm., Mda., Mgd., Mnb., Pang., Sbl., Sbn., Sul., Tag. *lán͠git;* Ibk. *lan͠gi't;* Inb. *dan͠git;* Sbl.-Bol. *rán͠git.*
 ? c: Knk. *kayan͠g,* sky; Inb. *akayan͠g* high.

83. **sleep, to**; a, ———; b, *a-ka-lu-kán;* c, ———.
 Bis. I., Bkl. *lukó',* to lie down (used of animals); Bkl., Pamp. *lúkub,* to lie or sit down, cover the eggs or chicks, brood; Sbl.-Bol. *márek;* Sbl.-Iba. *málek;* Sbl. *alók,* to sleep, *kakalokán,* bed, sleeping-place; Ifg. *málok, kalókan,* id., id.

84. **small**; a, *di-ít;* b, *i-bon-tó;* c, *sin͠g-it* (*sin͠g-gít?* E. E. S.).
 a: Bis.-I. *diótai;* Bis.-L. *gutíai;* Bkl. *sadít;* Bkl. *diít, dikít,* a little; Bon. C. *akit;* Ibk. *baddi'*^{t}; Ilk. *basít;* Tag. *maliít.*
 b: No cognate material found.
 ? c: Tag. *malin͠ggít.*

85. **snake**; a, *ú-lai;* b, *útan;* c, *ta-láu.*
 a: Bkl. L. *hólag,* big snake; Ibk. *iráu;* Ibk. *ulag,* rat; Ifg. *úlôg;* Ilk. *úleg;* Inb. *ireu,* big snake, *uloeg,* small snake; Klm. *irao;* Pamp. *ulai,* worm; Sbl. *úlai;* Tag. *ólai,* intestinal worm.
 b: No cognate material found.
 c: This is the same as the Nauhan word for "neck"; probably due to interpreter understanding the question "What is 'snake'?" as "What is 'neck'?" This will not appear improbable to any one who has noticed the difficulty many Filipinos have in distinguishing between the English long *a* and short *e*.

86. **spear**; a, *hu-nú;* b, *sí-bat;* c, *si-bat.*

a: No cognate material found.

b, c: Bkl. L. *sibatsíbat,* barbs of palm wood arrow; Ifg. *híbat,* barb; Pamp. *sibat;* Sbl. *hibát,* dart, lance; Sbn.-Dum. *söbat,* spear with detachable head; Bkl. L. *hibát,* to cut on a slant.

87. **spring**; a, *bul-bú-gan;* b, *tú-bu-san;* c, *bu-kál.*

a: Bis.-M. *tuburán;* Bis.-M., Bkl. *tubúd,* to flow, spring, bubble up; Bkl. *buru'búru',* to bubble; Bon. J. *ibig;* Bon. C. *öböb;* Ifg. *ûbûb, ôbôb;* Ilk. *ubbúg;* Mda. *tubúd;* Mnb. *tubudán;* Pamp., Tag. *síbul;* Sbl. *hubúl;* Sbn. *tubud.*

b: Perhaps this is from the same root *bug=bud=bur=bul* found in words under a; Bkl. has many forms where *r=s,* especially such reduplications as *kiri'kísi',* to rub between the fingers, *orokósok,* the rushing sounds of water, etc.; Ae.-Bat. has *sanum* for *danum=ranum=lanum,* water.

c: Pamp., Tag. *bukál;* Sbn.-Dum. *buál;* Bkl. L. *bukalbukál,* to bubble; Sbl. *bukal-bukál,* bubbling spring.

88. **star**; a, *pam-ga-sán;* b, *ma-gí-rum;* c, *ga-lai-mai.*

a, b: No cognate material found.

c: No Phil. material found, but (?) Amblaw *maralai* (Wallace, Mal. Arch., p. 487).

89. **stomach**; a, *ti-án;* b, *bo-yon͠g;* c, *pu-ná.*

a: Bis., Ilk., Sbl., Sul., Tag. *tián,* belly; Bis.-M. *tián, tídyan;* Pamp. *atián,* id.

b: Bon. J. *fuán͠g,* intestines; Gin. M., Ting. *buán͠g,* id.; Inb. *birun͠g,* bladder of fish; Ifg. *bídun͠g,* bladder; Bkl. L. *búyon͠g,* corpulence.

c: No cognate material found.

90. **sun**; a, *i-nít;* b, *al-dáo;* c, *ma-i-bún͠g.*

a: See **hot.**

b: See **day.**

c: See **afternoon** and **hot.**

91. **sunrise**; a1, *mak-súrip-súrip;* a2, *mag-sín͠g-git;* b, *u-ma-ga;* c, *u-bas-tú.*

a1: Bkl. *sir'íp,* to peer, peep, look out or in; Pamp., Tag. *sílip,* id.; Bis.-M., Mda. *sílib,* id.; Ifg.; *hílîp,* sunset. (See also *magsálup* under **sunset.**)

a2: Bkl. L. *rin͠g-gít,* great heat of the sun.

b: Bis., Bkl., Tag. *ága,* morning, to dawn, verbal prefix *um.*

c: Pamp., Tag. *búkas;* Mda., Mnb. *búkas,* dawn; Inb. *kabuásan,* to-morrow, *buastó,* day after to-morrow; Bon. J. *aswakus,* to-morrow; Ilk. *to,* a demonstrative particle denoting futurity. (See also **to-morrow.**)

92. **sunset**; a, *mag-sál-up;* b, *mad-lum-ani;* c, *ba-ya-pún.*

a: Bis.-M. *sálup,* to set; Bis.-A., Mda., Mnb. *sáup, sáyup,* id.; Mda., Mnb. *sayupán,* West; Bkl. *sulnóp,* to set, *sulnópan,* West; Sbl. *hunlóp,* to disappear; Sbn. *sindöp göndau,* Sbn.-NR. *sindúpan,* West.

It seems that the same root runs through the words cited here and under **sunrise,** a.

b: See *madlúm* under **night**; for the ending *-ani* see note under **afternoon** and compare *kapuni* under **yesterday**.

c: See *girapunaní* under **afternoon**.

93. **there**; a, *á-ti;* b, *am-ba-sa-tá;* c, *bal-yó.*

a: Bis.-M. *dídto, ídto, sádto, yádto;* Bon. J. C. *ischi;* Ifg. *hîdî;* Sbl.-Bol., Sbl. Iba *íti*, here, Sbl. *itáu.*

These forms are given tentatively, as resembling somewhat the Mgy. *ati.* The difficulty of tracing the three common adverbs of place has already been referred to under **here**. In this case it is increased by the fact that it is not specified whether the English word is "there (near the person addressed)" or "there (distant from both speaker and person spoken to)," a distinction that is quite definite in most, if not all, Philippine languages.

b: No cognate material found, except (?) Mda. *desídto.*

c: Bkl. *balió*, Ilk. *balíu*, the other side, opposite bank, etc.

94. **they**; a, *sidá;* b, *urá-boo;* c, ———.

a: Bis. *sirá, silá;* Bkl. *sindá;* Ifg. *didá;* Sbl. *hilá;* Tag. *silá.*

b: Ibk. *irá;* Inb. *era;* Pang. *ira;* Bkl. *bió'*, all, whole; Tag. *boó'*, id.; Ibk. *big*, all, nothing but; Ilk., Pang. *biúg.*

This compound form is perhaps not the one commonly employed, but due to the interpreter emphasizing the fact that he wanted the equivalent not of Tag. *siá*, "he," but of *silá lahát*, "they all."

95. **thou**; a, *ká-wo;* b, *ká-wo;* c, *ka-but-yák.*

a, b: Bis., Bis.-M., Mda. *ikáu;* Bkl. *iká;* Bon. C. *siká;* Ibk. *sikáu;* Ilk. *siká;* Inb. *sikam;* Sbl. *hiká.*

c: No cognate material found; cp. *bagiñgyák* under **I**.

96. **to-day**; a, *ta-iñg-úna-pag-sí-rañg;* b, *bañg-úna;* c, *tak-tuñg.*

a, b: Bis., Bis.-M., Mda., Bkl., Bnu., Mda., Mnb., Sul., Tag. *báñgon*, to rise, "get up"; Ibk. *máñgun*, id.; Ifg. *báñgun*, id.; Bon. C. *fumañgun*, id. (for *pagsírañg* see *sírañg* under **day**).

It seems scarcely probable that so long a phrase as that given under "a" should be the only way of expressing the idea "to-day," but Doctor Miller says he questioned his interpreter very insistently and was not able to obtain any other expression.

c: No cognate material found.

97. **to-morrow**; a, *al-dáu;* b, *gi-ra-bas;* c, *a-lu-bás.*

a: The use of *aldáu*, "day", "sun", for "to-morrow" is, as far as I know, unique; Bkl. has, however, *nu-sárong aldáu*, "on the other day" for "day after to-morrow."

b, c: See *ubastú* under **sunrise**.

98. **tooth**; a, *nyí-pon;* b, *ni-pön;* c, *nyí-pin.*

Bgb., Bis., Bis.-M., Bkl. Sbl. *ñgípon;* Ibk. *ñgípan;* Ilk., Mda. *ñgípen;* Pamp. *ípan;* Pang. *ñgipoen;* Tag. *ñgipin;* Dmg. *nipon.*

99. **tree**; a, *ká-yo;* b, *ká-yo;* c, *ka-yó.*

Bis., Bkl., Tag. *káhoi;* Bis.-M. *káhui;* Ibk., Ilk., Sbl.-Bol. *káyo;* Bon. C., Mda. *kaiu;* Sbl. *káiyo*, wood, *póon-káiyo*, tree; Ifg. *kai'yu;* Mnb. *kádo* or *kájo.*

The distinction made in Sbl. between "tree" and "wood" is one that, where there is any danger of ambiguity, must be made in many Philippine and other IN languages, the word *kayu* meaning both "tree" and "wood" in perhaps a majority of the languages where it occurs.

100. **ubi**; [15] a, *ubi;* b, *ubi;* c. *ubi.*

Bis., Bkl., Ifg., Ilk., Sbl., Tag. *úbi;* Mal. *ubi, tuber.*

101. **up**; a, *a-buát;* b, *sañg-a-wai;* c, *tag-bús.*

a: Bis., Bkl., Tag. *búhat*, to raise, lift; Pamp. *búat*, id.

? b: Sbl. *tá'gai*, up, above.

c: No cognate material found.

102. **walk**; a, ———; b, *mañg-a-dan;* c, ———.

See *dalágan* under **run**.

103. **water**; a, *da-núm;* b, *sá-pa;* c, *lu-búñg.*

a: Ban., Bon. S., Btn., Gin. S., Ibk., Ilk., Knk., Lep., Pamp., Pang. *danúm* or *dánum;* Ifg. *dánum*, juice, liquid; Sbl. *lanúm;* Bon. J. *chenum;* Bon. C., Inb. *chanum.*

This word for "water" is undoubtedly connected with the very general Phil. *inum, inom,* "to drink". *Danum* is exceptional in its strikingly uniform geographical distribution, all the languages north of Tag., as far as I know, without exception, having it, while all languages from Tag. southward have words from the root *ig*. Ifg., however, has the word in a different sense, "water" being *litíñg.*

b: See *sápa* under **river**.

c: See *libúñg* under **river**.

104. **where**; a, *na-án;* b, *sa-ro-ba-tái;* c, *ag-du.*

a: Bis. L. *háen;* Bis.-M. *hain;* Bis.-I. *díin;* Bkl. *haén, saén;* Ifg. *dáan;* Mda. *wain;* Tag. *saán.*

b: No cognate material found.

? c: Bon. C. *ento;* Sbl. *aití.*

105. **white**; a, *ma-lag-tí;* b, *ma-pú-ti;* c, *ka-buk-sí.*

a, c: These two forms seem to belong to a very widely distributed and extremely variable series of words (derived from a root *gas=das=ras=las?*) having such meanings as: white, bleached, faded, refined, yellow, blond, pale, light, etc. More than forty such terms, not counting numerous plant names, are known to me, of which the most characteristic are cited: Pamp. *dasdás*, Tag. *dig'ás*, Bkl. *dagás*, Bis. *dug'ás*, to blanch rice; Bkl. L. *bugáse'* exceeding whiteness; Tir. *rasi-rasi*, very white; Bis. *duak*, light color; Bgb. *daddas*, to fade; Pamp., *Tag. busílak*, whiteness; Tag. *busák*, exceeding whiteness; Bis. *buság*, white;

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[15] The Tag. name of a yam (*Dioscorea alata* L.), but probably applied in various regions also to other species of the same genus.

Tir. *busë*,[17] blond, *busoë*, dark blond; Ting. *nabutaak*, white; Bkl. *luñgasí'*, *luñgsí*, pallid; Tir. *melusí*, *menlusë*, id.; Tag. *bigás* and cognate forms. (See **rice**.)

b: Bis., Bis.-M., Bkl., Bnu., Mda., Mnb., Pamp., Sbl., Tag. *maputí'*; Inb. *amputi*; Ilk. *púti* (of cloth and yarn only); Tir. *futë*; Sbn. *gömputi*.

106. **woman**; a, *ba-bá-ye*; b, *ba-bái*; c, *ba-í*.

Ban., Bis.-M., Ibk., Ilk., Bon. S., Gin. S., Klm., Knk., Lep., Mgd., Pamp., Sbl., Sul., Tag., Tiñg-. *babái*, *babá-i* or *babáe*; Bis., Bkl., *babáye*; Ifg. *baba'-i*; Inb., Pang. *bíi*; *Bgb*. *bai*, *báie*; Pang. *bai*, grandmother; Bnu. *buyáu*; Mda. *búbai*; Mnb. *buhí*.

107. **work**; a, ———; b, *pa-ma-na-win*; c, ———.

No cognate material found, unless from * *pama-gawa-in* <Tag. *gawá*, to make, do, work.

108. **wrist**; a1, *ka-la-san*; a2, *ka-ma-óo*; b1, *ka-ro-rá-yan*; b2, *pa-ma-da-án*; c, *pai-lu-pu-hán*.

a1: No cognate material found.

a2: Bkl. *kamaóo*, back of hand; Pamp. *kamaóu*, id.

b, c: No cognate material found.

109. **yesterday**; a, *ka-aldáu*, b, *na-á-pon*; c, *ka-pu-ni*.

a: The use of the preposition *ka* to form adverbial phrases referring to past time is common, e. g., Bkl. *kasuúdma*, yesterday, *kasubáñggi*, last night, etc., Tag. *kagab'í*, yesterday; for the use of *aldáu* here, compare *aldáu*, **to-morrow**.

b, c: Bis.-A. *kahápon*; Bkl. *kahápon*; Pamp. *nápun*; Sbl. *na-ápon*. See **afternoon**; for ending *-i*, compare *girapunaní* under **afternoon** and *madlumani* under **sunset**.

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[17] Orthography of Bennásar, Diccionario Tiruray-Español. Manila (1892); *ë* is pronounced as French *é* final. Conant, "F" and "V" in Phil. Languages, *Pub. P. I. Bur. Sci., Div. Ethnol.* (1908), 5, 136.

NUMERALS.

ENGLISH.	a, BULALAKAO.	b, ABRA DE ILOG.
one	usá [a]	isa
two	duá	dalawa
three	tuló	tatlo
four	upat [b]	apat
five	líma	lima
six	unúm [c]	anim
seven	pitó	pito
eight	waló	walo
nine	siám	siam
ten	sampólo	sampo
eleven	sampolo-ma-usa	labing-isa
twelve	sampolo-ma-dua	labing-dalawa
twenty	dua-polo	dalawan-po
twenty-one	dua-polo-ma-usa	dalawanpot-isa
thirty	———	tatlong-po
forty	upat-polo	apat-na-po
fifty	liman-polo	limam-po
sixty	unum-polo	anim-na-po
seventy	pitung-polo	pitom-po
eighty	walung-polo	walum-po
ninety	siam polo	siam-na-po
one hundred	sampolo kasikapat [d]	isang-daan

[a] Both the Samar-Leyte and the Cebu Bis. have *usa*.

[b] Samar-Leyte *oopat*, Cebu *upat*.

[c] Samar and Leyte *oonum*, Cebu *unum*.

[d] This form is incomprehensible to me except on the supposition that Doctor Miller's informant was thinking, not in abstract numbers, but in terms of money. *Sikapat* in Bis., Bkl., Tag., and many others is "the fourth part (of the *salapi* or half peso)," *i. e.* Span. *un real.* There must have been widely known in the Islands a unit of value called *salapi* (Skt. *rupya* Eng. rupee; see Tavera, El Sanscrito en la Lengua Tagalog, Paris, 1887) which was approximately equal to a half peso at the time of the Spanish conquest, for most of the native ways of counting money are based on the half peso and the real. The Spanish-Philippine peso consisted of eight reales, but the *duro* or *peso fuerte* of Spain was worth ten reales and it does not seem improbable that this system might have been in use locally at one time or another. Also Tavera, *op. cit.*, gives: "*isang salapi*, moneda de cuatro reales fuertes (diez reales de vellon) ó sea medio duro". Now the fact that the peso was divided into five pesetas or one hundred centavos was already pretty well known during the Spanish régime, to say nothing of the universal spread of the new coinage established under the American government. Therefore, it seems not very improbable that the Mangyan in question, thinking of "one hundred" had a vague mental notion of that number of centavos and so said: "That's *sampolo kasikapat*" (ten reales).

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THE OLIGOCHÆTA TERRICOLÆ OF THE PHILIPPINES. PART I, THE GENUS PHERETIMA.

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The Director of the Bureau of Science of the Government of the Philippine Islands has been so good as to forward to me a number of bottles and tubes containing a large series of earthworms, collected in the Philippine Islands and under his direction, with a request that I would examine and report upon them. I am very grateful to the Director for this opportunity. I desire also to offer my thanks to the gentleman, Mr. R. C. McGregor, assistant in the Bureau of Science, who collected the specimens upon which I here report, which proved to be in excellent condition for investigation.

The collection forwarded to me contains a considerable number of new species of *Pheretima* upon which I write in the present communication. However, the account which I give does not deal with all of the species of that genus contained in the collection. There were in addition to those described in the following pages several examples of a species which I refer with some doubt to *P. montana*, and a single, large, not fully mature specimen which I was unable to place with accuracy. I propose to defer the consideration of these two species until I receive more specimens.

All of the new species described in the present paper are based upon specimens from the Island of Luzon.

Although the genus *Pheretima* forms the bulk of this collection, there are also specimens, or at least 1 example, of a species of *Pleionogaster*, and some small worms belonging to the genus *Benhamia*. I intend, in the present communication, to concern myself only with the genus *Pheretima*, leaving the other genera to be dealt with in successive reports, in the course of which I propose to deal, also, with the species already described as natives of the Philippine Islands. There will thus result, I hope, a fairly complete account of the earthworm fauna of this part of the world.

Pheretima decipiens sp. nov.

The species of *Pheretima* which I describe here under the above name is not, I am compelled to admit, to be certainly regarded as a new species. Nevertheless, after a careful consideration of the literature, I feel quite unable to identify it positively with any other species. The only alternative, therefore, is to give it a new name. The identification of the members of this genus is becoming a very difficult task. This is largely due to the omission in some earlier records of characters now, but not then, known to be of considerable importance in the discrimination of species, and also to the fact that many species have been founded upon one individual, or at least upon the dissection of but one individual. That there are anatomical variations, a study of the present and of other species fully demonstrates. *Pheretima decipiens* belongs to that group of species of the genus which is characterized by the following assemblage of important and diagnostic characters: There are no setæ upon the clitellum which occupies the whole of segments XIV—XVI; there are no traces of genital papillæ; the male pores are large and rather far apart, being separated by some 8 setæ; the spermiducal glands are relatively small, are contained within the XVIIIth segment, and open to the exterior by means of a large bursa copulatrix; cæca are present; spermathecæ, more than 1 pair. I make a point of leaving out the more exact characterization of the spermathecæ in this preliminary diagnosis, since I find them to vary in the species which is at present under discussion.

But with this limitation, there are only the following species, besides the present, which agree in the characters enumerated above. They are *P. philippina* Rosa,[1] *P. pura* Rosa,[2] and an assemblage of "species" which I have dealt with in my revision [3] of this genus under the name of "*Amyntas cingulatus.*" I have included in the latter assemblage species which have been described as *P. cingulata* Vaillant (in part), *P. darnleiensis* Fletcher, *P. vaillanti* Beddard, *P. martensi* Michaelsen, *P. indica* Horst, *P. eoa* Rosa, *P. madelinæ* Benham, *P. padasensis* var. *lokonensis* Michaelsen, and *P. belli* Rosa. Michaelsen, on the other hand, who reviewed the genus at about the same time as myself, arranges these 9 "species" into the following: *P. martensi* (including *P. eoa*), *P. vaillanti, P. darnleiensis, P. belli, P. padasensis* var. *lokonensis, P. padasensis* var. *made-*

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[1] *Ann. k. k. Nat. Hofmus.* (1891), 6, 397.

[2] *Ann. & Mag. Nat. Hist.* (1898), II, 7, 285.

[3] *Proc. Zoöl. Soc. London* (1900), 615.

linæ, and places *P. cingulata* as a synonym of both *P. robusta* and *P. quadragenaria.* He thus differs greatly from me.

I am still not in agreement with Michaelsen's reasons for regarding as different *P. martensi* with which must be regarded as synonymous *P. eoa;* for, although in most of the examples of the species which I am now considering I never saw the small accessory diverticulum upon the duct of the diverticulum which characterises *P. martensi,* it did occur in one individual. On the other hand, the noticeably larger setæ distinguishes my species. Rosa says nothing of this in describing *P. eoa,* nor does Michaelsen in his monograph of the group in Das Thierreich.

It is also this character, that is, the large size of the setæ of the first 8 segments, which leads me to regard the present species as differing from the others of the *P. cingulata* group. The number of spermathecæ (although I found only 3 pairs in one individual) serves to differentiate *P. decipiens* from *P. philippina* and *P. pura.* There remains, however, the undoubted fact that the present species is very near to the "*P. cingulata*" group, and further examination of the species referred to that group may prove an identity with *P. decipiens* which at present is not quite plain.

The most salient external character of the present species is one in which it agrees with *Pheretima benguetensis;* namely, the large setæ of the anterior segments of the body; their arrangement in the present species appears to be identical with that in *P. benguetensis.* That is, after the IXth segment the setæ suddenly diminish in size as compared with those on that segment. This character is very obvious and needs no careful examination for its demonstration. In its other external characters, also, *Pheretima decipiens* seems to be exactly like *P. benguetensis.* It has a clitellum of fully 3 segments without any setæ thereon; there are no genital papillæ. The male pores are separated by from 6 to 8 setæ and each lies at the level of about the eighth setæ. The reason for the apparent discrepancy in the above remarks is that the pores are large and there are no setæ close to the inside of each pore on the XVIIIth segment. The dorsal pores and the oviducal aperture are precisely as in *P. benguetensis.* In regard to the alimentary canal, the large intestine undoubtedly commences in segment XVI. When the intestine in this segment is cut open, the narrow œsophagus can be seen to open onto a median, valvular projection into the lumen of the large intestine. The cæca are conspicuous, but only moderately long, not so long as in the examples of *P. benguetensis*. The spermathecæ differ from those of the large worms with which the present worm is compared mainly by the fact that the diverticulum is not so long as is the spermatheca itself. There are, also, some differences among individuals. In 1 specimen there was, as already mentioned, a small accessory diverticulum; in 2 other individuals the VIIth segment contained 2 spermathecæ at any rate on one side of the body; of these, one opened on the intersegmental furrow VI/VII, the other on VII/VIII, so that *externally* there was no variation from the normal. In one there were only 3 pairs. The ovaries lie in segment XIII and are particularly large and of a bushy appearance. The same segment, also, contains a considerable number of large *monocysts*. Both ovaries were removed and placed upon a slide and away with them came a number of these monocysts which were clearly attached to the ovaries. This is a very remarkable point of likeness between this species and the next that the XIIIth segment of *Pheretima benguetensis* also contains a group of large gregarines apparently quite similar to those of *P. decipiens*. But in *P. benguetensis* the ovaries were small, although easily recognizable, and a pair of sacs was found close to them which may be sperm sacs or ovisacs, whereas in *P. decipiens* those sacs if present must have been very small. The sperm sacs lie in segments XI and XII and are about equisized. Each has a free projecting lobe as in *P. benguetensis* and various other species. In the present species these free projecting lobes are asymmetrical. Of the posterior pair of sperm sacs, that on the right is the longer; the converse is the case with the anterior pair. These appendices do not cap the sperm sacs as in the species with which I am particularly comparing *Pheretima decipiens*, for the sperm sacs grow up on either side beyond the origin of the appendices. It is probable, however, that morphologically their position is the same. The sperm reservoirs appear to be much the same as in *P. benguetensis*. There is, however, a difference as regards the sperm-duct funnels. These latter are obviously dependent into the sacs from the septa, a difference which may be due to smallness of size of the present species.

The spermiducal glands and the terminal bursa copulatrix are very like those of *P. benguetensis*. They vary somewhat in different individuals of the present species. The gland has the same compact form and semicircular, or horeshoe-like, outline and it closely embraces the bursa. The duct opening into the bursa varies in form. In one example it was quite straight, and therefore very short, thus contrasting with that of *P. benguetensis*. In others, however, there were varying degrees of curvature in this duct, and corresponding to this a slight difference in the actual point of opening into the terminal bursa. The sperm ducts can be seen to unite where they approach their opening into the spermiducal duct as in *P. benguetensis.*

Pheretima benguetensis sp. nov.

Collected like the last species at an altitude of 1,524 meters in the Province of Benguet, Luzon, were several examples of a large *Pheretima* which is undoubtedly like the last species in many particulars, but which I am nevertheless disposed to regard as distinct from *P. decipiens.*

TABLE I.—*Measurements of the four large specimens of Pheretima benguetensis.*

Length.	Diameter.	
	Anterior.	Posterior.
mm.	*mm.*	*mm.*
190	12.5	10.00
150	12.0	9.75
158	11.5	9.00
188	11.5	9.00

Thus the length may be fairly described as 190 millimeters and the diameter at the head as 12.5 millimeters. The measurements of length, however, are obviously only approximate, for in one of the longer and one of the shorter individuals the last segment of the body bore a complete circle of large setæ, and the anus showed signs of regeneration. In the other two, on the contrary, the last 2 or 3 segments bore no setæ, and the anus presented a normal appearance. The former, therefore, have clearly been injured during life and were originally some segments longer. The color of the large individuals was in every case dark purplish-blue on the dorsal surface, passing into pale brown ventrally. Dorsally, an iridescence was plainly visible in certain lights.

The segmentation of the body offers certain features which are characteristic. The first 9 segments of the body form a kind of "head" which is very sharply marked off from the rest of the body. The segments are very distinct from each other, and convex, suggesting in general appearance the "rattle" of a rattlesnake. The setæ, which are larger upon these segments than upon the Xth and following segments, are implanted upon a prominent ridge which looks slightly backward. The setæ themselves are certainly directed backward. This state of affairs is plainly shown in the accompanying figure (Plate I, fig. 1) and is an exaggeration of what occurs in some other species of *Pheretima*. It is, however, a very distinctive mark of the present species as compared with others dealt with in this account of the earthworms of the Philippines with the exception of its close ally *P. decipiens*. The segments which follow, suddenly change their character. The first 4 of those; that is, segments X—XIII, are equisized and of about equal diameter, as a matter of fact, with any of the last 2 or 3 of the "head" series. While the latter are hardly divided into secondary annuli, the segments X—XIII are each composed of at least 3 distinct annuli of which the middle one bears the setæ implanted upon a slight ridge. This secondary annulation is of some importance because it is usually dealt with in giving the characters of various species. It is clear from the conditions met with in this *Pheretima* that the number of secondary annuli is a character which must be made use of with caution. For in one individual there were 3 annuli, and 3 only, to each of segments X, XI, XII, XIII. In two others, however, the anterior annulus was divided into two, and there were thus 4 annuli to each segment. The fourth specimen was too much stretched to permit of accurate observation. In 2 individuals the clitellar segments were plainly visible through the immaturity of the clitellum, and these segments, much narrower than the preceding, were made up of only 2 annuli each.

The clitellum occupies the whole of segments XIV—XVI, beginning with the furrow separating segments XIII/XIV and ending with the furrow separating segments XVI/XVII. When fully developed, no segmental boundaries are visible upon it; but the dorsal pores are visible and thus define the individual segments externally. Nor is there any trace of setæ that I could discover. This absence of setæ applies not only to the fully developed clitellum, but to the clitellum of less developed specimens. The 4 examples which I have studied illustrate the growth in length of the clitellum as it becomes mature. In two the clitellum showed plainly the boundary lines of its component segments and was not quite so long as the preceding segments XII and XIII. In the 2 remaining, fully mature examples, the clitellum was rather longer than those 2 segments taken together.

The dorsal pores certainly commence between segments XII/XIII. Earlier than this, I have not been able to recognize them. They are obvious, as already mentioned, upon the clitellum, and they extend to the very end of the body. I found a perfectly well-marked dorsal pore between the preanal and the perianal segments. *Genital papillæ* are entirely wanting in this species.

Of the intersegmental septa it may be said that none of them is very greatly thickened, yet some of the anterior septa are distinctly thicker than others. The first recognizable and definite septum divides segments IV/V; this and the two following septa are slightly thickened as compared with those in the posterior region of the body. Between VII/VIII is a delicate, thin septum contrasting with the foregoing. The VIIIth, IXth, and Xth segments, in which of course lies the gizzard, are not separated by septa at all,[4] and the intersegmental boundaries are the only limits of the segments in question in the gizzard region. The septa dividing X/XI and the 3 following segments are somewhat thickened and equally so. Thereafter, the septa are delicate to the end of the body.

Certain features in the alimentary canal of this genus serve to discriminate species from species. Therefore, I shall direct attention to the general anatomy of the gut, though several of the facts to which I shall refer have not yet been made use of in definitions of species and are not yet known to vary. The gizzard belongs presumably to segment VIII as in other members of the genus; it is elongated and barrel-shaped, being longer than broad. After the gizzard, and extending to the end of the XIIIth segment, is a very vascular section of the œsophagus which doubtless represents potentially the calciferous glands of other earthworms in which these glands occur; they appear to be always absent in the genus *Pheretima*. In XIV, XV, and XVI, the œsophagus is narrower and not vascular or, at least, not so markedly vascular as anteriorly. The wide intestine begins in the XVIIth segment. Some discrepancy will be noticed between this enumeration and that of other writers. The large intestine has been variously described as commencing in the XVth or XVIth segment. It may be that this statement is

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[4] It is probable, of course, that the wall of the testicular sacs represent a portion of the otherwise missing septum IX/X.

more correct than that which I have first made with respect to *Pheretima benguetensis,* for the section of the gut which lies in the XVIth segment, although much narrower than that which ensues and thus more like the preceding section of œsophagus, is of the same brown tint as is the large intestine. The large intestine has a shallow typhlosole and a pair of long cæca. These appear to arise in the XXVth segment and, when fully extended forward, to reach as far as the XXth segment. They are thus rather long.

The testes are contained within the testicular sacs, to be described presently in connection with the sperm sacs, and can be brought readily into view by opening those sacs and washing away the adhering masses of sperm. It is noteworthy that the anterior testis is the smaller and that its position is a little different from that of the posterior male gonad. The anterior testis lies nearer to the middle ventral line of the body. It is, also, to be noted that the posterior testis does not lie around or quite close to the vas deferens as it emerges from the Xth segment, as is frequently the case among earthworms. This testis is distinctly farther from the middle line ventrally than is the anterior testis and is thus not in contact with the vas deferens belonging to the anterior testis.

The sperm-duct funnels of this *Pheretima* are represented in Plate I, fig. 2. It will be seen that the two of one side of the body, anterior and posterior, are equisized. Furthermore, it is to be noted that they do not hang from the septa into the interior of their respective segments, as is the case with many earthworms. The funnels lie flat upon the ventral body wall and their mouths look directly upward. The periphery of the funnel is regularly folded. The 2 sperm ducts are very distinct on each side of the body as two ducts to the actual point of their connection with the duct of the spermiducal gland. It is important to notice this fact since in several species the two ducts of one side fuse immediately behind the posterior funnel. The posterior of the 2 sperm ducts, that is, the one which arises from the funnel of segment XI, runs outside.

There are 2 pairs of sperm sacs situated in segments XI and XII. The posterior pair is very distinctly larger than the anterior pair and is made up of twice as many tubes. The lobate structure of the sperm sacs is very characteristic of this species, and on a more minute examination each lobe is seen to be divided into tiny lobules. Dorsally, each posterior sperm sac (that is, of segment XII) is capped by a lobe of different appearance, which is not subdivided into minute lobules and is browner as contrasted with the whiter color of the rest of the sperm sac. This peculiar differentiation of the sperm sacs is not unknown in other species of the genus *Pheretima*. Each sperm sac is connected with a sperm reservoir as it has been termed, but for which the term testicular sac seems much more suitable since the testes lie within it.

Ude[5] has lately called renewed attention to these sacs which present differences in different species. In the species of *Pheretima* now under consideration there is no median fusion between the pairs of testicular sacs. On the other hand, the 2 sacs of each side in those belonging to segments XI and XII are apparently hardly in communication, and unquestionably in contact. When the sacs in question are opened and their contents revealed, the complete separation between all four of them becomes very obvious. When the walls are cut away dorsally the cavity of each sac is seen to be circular in contour. The anterior wall of the anterior pair presumably represents the otherwise entirely missing septum between segments IX/X.

In view of the certain amount of variation met with in the internal structure of *Pheretima decipiens,* it is important to notice that there is practically none in *P. benguetensis,* although this statement must be qualified by the further consideration that I am in a position to report upon only 2 fully mature individuals. In the second of these, I found a precise agreement with the example described above. The appendicular lobe of the sperm sacs, however, originated rather farther down than in the first named individual where each caps its corresponding sac, but in their relative smallness these appendices contrast with those of *Pheretima decipiens.*

The spermiducal glands and the terminal male apparatus lie entirely within the XVIIIth segment, whose septa, however, bulge somewhat laterally to accommodate these male organs. The spermiducal gland is divided into 3 inequisized, principal lobes, of which the anterior is the largest, and the middle one the smallest and again subdivided into two. A division of these lobes into equal-sized lobules is also quite plain. The duct of the gland is short and rather swollen, and either straight (running at right angles to the long axis of the body) or slightly bent posteriorly; it opens into a well developed bursa copulatrix of circular area. The vasa deferentia can be traced to their opening at the commencement of the muscular duct of the spermiducal gland, a point which is hidden by the glandular tissue. There are no accessory glands in the neighborhood of the "prostates."

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[5] *Ztschr. f. wiss. Zool.* (1905), **83**, 405.

The ovaries lie in the XIIIth segment and are not large,[6] in spite of the fact that the worm is large and fully mature. The position of the ovary on each side is just over the separate sperm ducts of that side where they emerge from the septum.

The spermathecæ are present to the number of 4 pairs in correspondence with the external apertures already described. The main pouch is spherical to oval in contour and there is a distinctly marked distal portion leading to the exterior. The single diverticulum of each spermatheca opens into this duct not far from its external orifice. On the under surface of each spermatheca, near the junction of the thin-walled pouch with the thicker-walled duct, is an adherent tuft of nephridial tubules apparently quite like those which Michaelsen[7] has figured in his species, *Pheretima martensi.* The diverticulum is longer than the spermatheca and consists of a narrow duct, often coiled upon itself near its end or wrapped around the terminal, cylindrical portion of the spermatheca, and an oval pouch containing the sperm which is much smaller than the spermatheca.

Pheretima orientalis sp. nov.

A number of examples of this species are all small, slender worms, whose color, for the most part, has been removed by the spirit in which they were preserved. They now exhibit a whity-brown color save for the clitellum which is a dark brown. The length is some 98 millimeters; the diameter, 0.75 millimeter. The setæ form perfectly continuous rows upon the segments of the body, there being neither dorsal nor ventral gaps.

The clitellum commences a little posterior to the commencement of segment XIV and extends nearly as far as the setæ of segment XVI, say ⅔ XIV—⅓ XVI. All of its segments have setæ which are quite conspicuous in most cases. Those of the XVIth segment completely encircle the segment, which fact may be correlated with the absence of any glandular development upon the greater part of that segment. There is in fact no reason why the setæ should be absent. I am not so certain whether the setæ form complete circles upon the other segments of the clitellum; however, there is no doubt that they extend in every case for a considerable distance to the right and left of the ventral median line, and that it is not merely a question here of the persistence of 3 or 4 setæ. It should be noted in relation to this matter that all the 6 examples possessed setæ; thus there is no doubt as to the genuinely specific character of the permanence of setæ upon the clitellum.

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[6] Compare the very large ovaries of *Pheretima decipiens,* a much smaller species.

[7] *Arch. f. Naturg.* (1892), 13, fig. 20.

The dorsal pores commence on the intersegmental furrow XII/XIII. The oviducal pore or pores (for I could not distinguish the actual orifice or orifices) are borne upon a very conspicuous, transversely oval, field, contrasting by its whitish color with the surrounding brown clitellum. This field, moreover, is delimited by a groove which encircles it. This area, at any rate in those examples where it was most plainly delimited, obviously lies in front of the circle of setæ of segment XIV.

The male pores, as is always the case in those species of *Pheretima* where there is no terminal bursa copulatrix, are not at all conspicuous, and in the present species they are less so, even less than is usually the case, because of the genital papillæ which practically surround them. The pores lie actually in the line of the circle of setæ and are separated from each other by about 8 setæ. They are thus distinctly upon the ventral surface of the body (that is, they are not lateral in position), and in the intact worm there is some space visible to the right or left of each pore as the case may be. The large size of the genital papillæ, which nearly touch in the middle line, gives the erroneous impression that the male pores are closer to each other than is actually the case.

The most noteworthy fact about the intersegmental septa of this species is the presence of a well-developed septum separating segments IX/X. I am disposed to connect the presence of this septum with the existence of a well-developed pair of sperm sacs in segment X; or rather, perhaps, the presence of the latter is to be connected with the existence of this septum. This septum and the two which follow are rather stronger than the rest of those behind; so, too, are intersegmental septa VI/VII and VII/VIII. The septum VIII/IX is absent as a complete septum. I have found traces of it in the form of a muscular band attached to the intersegmental furrow VIII/IX.

The large intestine commenced with the XVth segment. The cæca are not large, but traverse 2 segments. The gizzard is rather elongated.

The last pair of hearts is in segment XII.

The sperm sacs of this species are in 3 pairs, situated respectively in segments X, XI, XII. The sperm reservoirs are not connected with each other either across the middle line or anteroposteriorly; they are scarcely distinct from the sperm sacs.

I can not distinguish from these examples, which are labeled "Benguet Province, Luzon, altitude 5,000 ft.," others from Pauai in the same province. In particular, the remarkable arrangement of the spermathecæ is the same.

The spermiducal glands are rather large and extend through segments XVI—XIX. They vary somewhat in their exact form and in the degree[8] of lobation of the gland tissue. In cases where the lobation is most pronounced, the gland is divided transversely (that is, to the longitudinal axis of the body) into finger-like, elongated segments; in others, it is subdivided into a greater number of smaller, rounded segments. In fact, there appears to be no very definite type of gland. All that can be said is that the spermiducal gland is much lobate. The duct is long and arises from about the middle of the gland; it first of all runs forward for a variable distance and then bends upon itself and passes backward to its orifice upon the XVIIIth segment. I could discover no trace of a terminal bursa copulatrix.

The spermathecæ of this species are very remarkable and quite unlike anything that has fallen within my experience. In one specimen there were 5 pairs of these sacs arranged in the following unusual fashion. The first 4 pairs open between segments IV/V and VII/VIII, respectively. The fifth and last pair open on the next intersegmental furrow; that is, VIII/IX, but are not in line with the preceding pairs; their point of opening is in fact very much nearer to the ventral median line. In a second specimen I could find only 4 pairs of spermathecæ of which the last opened to the exterior between segments VIII/IX. These spermathecæ in the case of every pair were symmetrical on both sides of the body. Again the spermathecal pores did not open in line. The 2 first on each side were in line with each other at the point of opening which was considerably external to the points of opening to the exterior of the 2 following spermathecæ; these latter were in line with each other. In a third example there were 5 spermathecæ on the right side of the body of which the last opened to the exterior between segments VIII/IX, and the orifice was much more ventral than those of the 4 anterior spermathecæ which were in line. The spermathecæ of the opposite side of the body appeared to be entirely symmetrical with these, and there is no doubt that the 2 last spermathecæ were so. I am disposed to think that the specimen in which I found only 4 pairs of spermathecæ had the last pair lost in the course of dissection, but I am not certain. Each spermatheca has a rather long and very narrow muscular duct. The diverticulum, which ends in a club-shaped, distal extremity, is about one-half the length of the spermatheca, and opens into the duct of the latter near its external orifice.

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[8] Sometimes with the addition of another segment.

Pheretima albobrunnea sp. nov.

Two examples of a rather slender species of *Pheretima* were collected at the same time and from the same locality as the last species, *Pheretima orientalis,* and were provisionally assigned to that species from which, however, they obviously differ. The color and the general external appearance is identical with those of *P. orientalis,* a fact which led to the original confusion between the two. Further than this the clitellum and its setæ and, indeed, all the external characters, with the exception of the male pores and the genital papillæ, are precisely as in *P. orientalis.* The male pores, like those of *P. orientalis* and of most if not all species of *Pheretima,* are in the line of setæ. They are, however, distinctly farther apart than in the last species and are separated by some 18 to 20 setæ. The pores themselves are equally small and inconspicuous. The genital papillæ of *Pheretima albobrunnea* are quite different from those of *Pheretima orientalis;* nor can the differences be put down, I think, to greater immaturity in the case of one set of worms or of the other; nor were there intermediate stages between the two. In the present species, the papillæ are smaller than in the last, and rather sucker-like, a depression occupying the middle of each papilla. The positions occupied by the papillæ are the same; that is, one lies anteriorly and one posteriorly to the male pore, and they are both upon the XVIIIth segment. The difference between these papillæ and the large flat papillæ of *P. orientalis* is very obvious.

The internal structure of this worm is very like that of *P. orientalis,* but shows, nevertheless, sufficient differences to distinguish the two very plainly. The septum dividing segments VIII/IX is absent; but the following septum, which is, also, frequently absent among earthworms [9] of this genus, is present and rather thickened. So also are septa VI/VII and VII/VIII. The large intestine commences in segment XV. The cæca are present and extend forward through 3 segments. The gizzard is rather elongate, but otherwise is not remarkable in its form.

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[9] Compare, for example, *P. benguetensis* described in the present paper.

The last hearts are in segment XII.

The sperm reservoirs are in segments X and XI, and those of each side of the body are perfectly distinct.

The sperm sacs are in 3 pairs and are situated in segments X, XI, and XII. The pair belonging to the XIth segment is the smallest.

There seems to be a pair of minute ovisacs in segment XIII lying above the very much larger ovaries. The spermathecæ are present to the number of 5 pairs and this is the most salient internal difference of structure between the present species and *P. orientalis*. They lie in segments V—IX, the last pair opening between segments VIII/IX. The diverticulum is quite as long as the spermatheca itself. It consists of a very slender duct ending in a long and club-shaped sperm pouch, which has the usual chalk-white appearance and doubtless, as in other Oligochæta, is the sperm-holding apparatus. It will be noted that the diverticulum is much longer than in *P. orientalis* and, also, rather differently shaped.

The spermiducal glands of this species are large, but not so extensive as in *P. orientalis*. Instead of extending through fully 4 segments as in the last-named species, these glands extend through only 3 segments in *Pheretima albobrunnea*. They are, also, much broader in proportion to their length than are the glands of *P. orientalis*. Each gland is divided into 3 principal lobes which are again somewhat subdivided. The duct is rather long and arranged in a different way from that of the last species. The duct emerges from the middle of the gland and runs toward the middle of the body, then bends backward, and runs parallel with itself to the point of opening. The latter portion of the duct is stouter than the anterior portion. There is no bursa copulatrix.

Pheretima sodalis sp. nov.

The same bottle which contained the specimens of *Pheretima orientalis* and *P. albobrunnea* contained, also, a number of examples of a third species closely resembling those two in both external and internal characters. Nevertheless, I believe it belongs to a perfectly distinct species, differing from either *P. albobrunnea* or *P. orientalis* quite as much as those differ from each other. *P. sodalis*, indeed, is even difficult to distinguish by external characters without a careful examination, for there is the same lack of coloration as in its allies and the clitellum with its setæ is precisely like those of the 2 species with which it must be compared. A description of one will serve for that of the other. The only recognizable difference which serves to discriminate the species externally is the condition of the male pores upon segment XVIII. These pores are rather widely separated, much as in *P. albobrunnea.* There are, however, only about 8 to 10 setæ between them, since the setæ cease a little way before the actual male pore. The latter is very conspicuous on each side of the body, although it is rather the elevation upon which it is borne than the actual orifice which is of large size. In the neighborhood of these pores, there are no genital papillæ; and it is the lack of these structures which at once distinguishes the present species from its allies. As all the 6 individuals of the species were the same, this character seems to me to be fully established as distinctive.

In its internal characters, *Pheretima sodalis* is somewhat intermediate between its near allies *P. orientalis* and *P. albobrunnea;* and it possesses, also, some characters peculiar to itself. Thus the septa of certain segments appear to me to be more strengthened than in either of the two species which I have just described. This was particularly the case with septa VI/VII and VII/VIII. Moreover, in the region of the gonads more segments are thickened than in those species of *Pheretima,* for in *Pheretima sodalis* the last of these specially thickened septa separated segments XIV/XV. As in the other two species, septum IX/X was present and septum VIII/IX absent.

The alimentary tract is like that of the two allied species and the cæca are present, but blunt and short. The last hearts are in segment XII. There are 3 pairs of sperm sacs in segments X—XII. In segment XIV is apparently a pair of ovisacs of considerable relative size, and in any case larger than the ovaries of segment XIII.

The spermiducal glands are large like those of *P. orientalis,* and there is the same tendency to division into finger-shaped, narrow, parallel lobes. They occupy segments XVI—XX. The duct runs at first forward and then backward, opening about opposite to its original emergence from the gland in segment XVIII. The spermathecæ are on the other hand rather more like those of *P. albobrunnea.* There are 5 pairs lying in line. The club-shaped diverticulum is not so long as the main pouch and opens into its narrow duct near the external extremity.

Pheretima pauaiensis sp. nov.

Closely alike in external appearance to *Pheretima orientalis* is a worm which I am obliged to regard as being of a new species.

It measures 70 millimeters in length and 3 to 3.5 millimeters in diameter and is, therefore, of about the same size as *P. orientalis* and others of its allies described in the present paper. It has, also, the same color and is indeed of exactly the same outward appearance.

The clitellum is of the same nature and ceases before the row of setæ of segment XVI. The other segments, of which it is composed, also have setæ upon them. The male pores are very conspicuous and much like those of *Pheretima sodalis.* They lie naturally upon segment XVIII in the line of setæ and are separated by about 10 setæ. The external feature which makes the present species particularly recall *P. orientalis* is the form of the genital papillæ.

The genital papillæ of *Pheretima pauaiensis* consist of a pair of apparently perfectly circular, disc-like cushions suggestive in color and size of the genital papillæ of *P. orientalis,* although very different in other details as will be seen presently. The 2 papillæ are approximated in the mid-ventral line of the body, being separated by an area which is about equal to the diameter of one of them. The papillæ lie upon 2 segments reaching from just behind the circle of setæ of segment XIX to just in front of the circle of setæ of segment XX. They are not interrupted (that is, made hour-glass shape) at the intersegmental groove.

The internal anatomy is not very different from that of *P. orientalis* and of its immediate allies described in the present paper.

There are 3 stoutish septa in front of the gizzard and those from IX—XIII enclosing the sperm sacs are also more strongly developed than those which follow. Cæca are present but not very long. The last pair of hearts is in segment XII. There are 3 pairs of sperm sacs in X—XII. The spermiducal glands are rather large and extend through segments XVI—XX. They are broken into many lobes. The duct arises at about the middle of the gland and at first runs in an anterior direction; it then bends upon itself and runs backward to its orifice upon the XVIIIth segment. This section of the duct is much the wider.

The form of the spermathecæ is characteristic of *Pheretima pauaiensis* as compared with its allies hitherto described. There are 5 pairs of these organs arranged in line as in the case of

P. albobrunnea. The spermathecal pouch is not always identical in form; it is sometimes oval and sometimes conical, the apex in this case occupying the blind end. The duct portion is sharply marked off from the pouch by its narrower caliber, but this region is not markedly muscular. The diverticulum is a little longer than the pouch and of rather peculiar shape. Each diverticulum is sharply divided into the terminal chamber and a duct. The terminal chamber is oval and apparently rather flattened which gives it a racket-like form. This is enhanced by the fact that the duct is at first very narrow and broadens toward its external orifice.

Pheretima monticola sp. nov.

Two examples of this new species were collected on Mount Pulog at an altitude of 2,880 meters, "on the grassy summit." It is a stoutish worm, 130 millimeters long and 7 millimeters in diameter at the head end. The color is pale brown with some purplish-brown patches in the postclitellar region. The clitellum is dark purplish-brown. The setæ form complete circles and are typically perichætous, their arrangement not being in any way divergent from the normal. The clitellum occupies the whole of segments XIV—XVI, and is entirely without setæ.

The male pores are very conspicuous and widely separated, lying of course upon the XVIIIth segment.

The genital papillæ of this species are highly characteristic. They are only shown at their full development, I imagine, in one example of the two. In that specimen there is a pair of papillæ on segment XVII and a pair upon each of segments XIX, XX. The arrangement, in fact, is somewhat like that of *P. biserialis, P. forbesi, P. polytheca,* and *P. malayana.* But the present species has fewer of the pre- and post-genital papillæ than any of those mentioned. The papillæ are not precisely in line with the male pores. They are a trifle to the inside of them. In addition to these 3 pairs there is a fourth pair upon segment IX. I examined very carefully the adjacent segments to see if there were others, but could find none. It may be that other specimens will show a greater development of papillæ than those reported upon here. The intersegmental septa of this species differ from those of many others, for none is missing and the gizzard in consequence lies entirely in segment VIII. There is no doubt whatever about this, for it is quite easy to count the septa and to refer them to the proper boundary lines between the segments. None of the septa in front of the gizzard is especially thickened, but those which encircle the sperm sacs are rather thicker and this is particularly to be seen in the case of segments XI and XII. In fact, septa X/XI and XI/XII are the thickest of the whole series. The septa in front of, and 1 septum behind, this series are also thick. They are connected to each other by many muscular strands of a tendinous appearance.

The alimentary tract has one feature of importance from a systematic point of view and that is the total absence of any trace of cæca. I was unable to find those outgrowths in either of the two examples studied and, therefore, presume that they are absent in the species. The intestine begins in segment XV. The gizzard lies in a single segment, the VIIIth, as already mentioned.

The organs connected with reproduction show some interesting features in the present species. The testes and sperm-duct funnels lie in segments X and XI as in all other species in which there are 2 pairs of gonads. However, they do not appear to be inclosed in testicular sacs which are so obvious in other species, but to lie freely in the segments. It might be remarked in criticism that it is hard to prove a negative and that delicate sacs enveloping the gonads may have been cut into and missed. I would rather base my statement, therefore, on positive than on negative facts. But the latter must be considered and it is pointed out that the funnels and gonads were easily exposed, apparently without cutting into any testicular sacs. Simply cutting along the line of attachment of the septa to the body wall until the region of the gonads was reached, brought the latter and their corresponding funnels into view at once.

A more positive argument is as follows, and although it only applies with certainty to the gonads and funnels of the XIth segment, it establishes the facts—that is, if it be accepted as an argument. In opening segment XI in both specimens of *Pheretima monticola,* the testes and funnels were easily seen, and arising from the anterior wall of the segment the sperm sacs belonging to it. The origin of each of these latter sacs was just above the testis belonging to it. The sac was quite as independent of the testis as is the ovisac (commonly present in this genus) of the ovary which, also, lies beneath it in a position very like that of the testis. As is abundantly shown in many figures and diagrams of the reproductive organs of *Pheretima,* the sperm sacs are outgrowths (secondary, perhaps) of the sperm reservoirs or testicular sacs. It is fair, therefore, to presume that testicular sacs, at any rate in segment XI, are wanting in *Pheretima monticola.* Sperm sacs occur in segments XI and

XII, and I think in segment X also. However, in segment X I may have mistaken masses of developing sperm for actual sacs.

The spermiducal gland is small and limited to one segment, the XVIIIth, the septa of which, however, are somewhat stretched apart to enable the gland to lie in this one segment. The gland is nearly divided into two and is compact in character; it is seen to be finely lobate when examined with a lens. The duct runs straight toward the mid-ventral line of the body; it then bends upon itself and runs parallel with its former section to its orifice, which is unprovided with a bursa copulatrix. The recurrent section of the duct is much the stouter. The ovaries and the oviducts were identified, but present nothing particularly noteworthy in appearance. The spermathecæ are in 4 pairs and open on the segmental furrows V/VI and VIII/IX. It is a remarkable fact that in both (the only) specimens the VIIIth segment contained 2 pairs of spermathecæ, one pair opening anteriorly, the other posteriorly; that is, between segments VIII/IX. This, indeed, furnishes one of the arguments for considering segment VIII to be separated by a septum from segment IX. In no species of *Pheretima,* so far as I am aware, does the posterior pair of spermathecæ open so far back as the intersegmental groove IX/X. I believe that the inclusion of 2 successive pairs of spermathecæ within the same segment is new to the genus *Pheretima.*

The spermathecæ are, also, somewhat unusual in their form. The pouch has a short diverticulum, which is really a portion of the pouch itself separated by an imperfect septum, as well as the independent and characteristic diverticulum. This state of affairs, however, was not apparent in the second specimen and, therefore, need not be considered as of great importance. The duct portion of the spermatheca is not important. The diverticulum is as long as, or even slightly longer than, the pouch. It ends in an oval receptaculum seminis which was double in the case of one spermatheca. The duct is narrow and coiled.

Pheretima incerta sp. nov.

A large number of examples of a small species of *Pheretima* was collected in the immediate neighborhood of the Bureau of Science building, Manila, which present many of the external characteristics of the 3 species which I have just dealt with, but which are undoubtedly different from any of those. Nevertheless, there is the outward resemblance in the whity-brown color of the clitellum, in the slender form and short length, and in the fact that the clitellum does not always embrace the whole of the XVIth segment. In addition to this, there is the absence of anteriorly situated papillæ; that is, upon segments in the neighborhood of those which bear the pores of the spermathecæ. The existence, however, of a pair of papillæ closely corresponding in position with the male pores upon segments XVII and XIX shows that the present species is not one of the three just described and brings it into obvious relationship with *P. posthuma*. The length of an average specimen is 70 millimeters; its diameter, 3 millimeters.

With *P. posthuma* I am well acquainted and have added several new facts in past years [10] to our knowledge of its anatomy. To my certain recollection many specimens at least which I have examined differed very markedly from that with which I am concerned in the present section of my catalogue of Philippine worms in their robust build, totally different from the slender worms which I call here *Pheretima incerta*. However, both Horst and Michaelsen assert the same of that species.

Another characteristic of the species *Pheretima posthuma*, which I do not find in those specimens under examination, is the form of the prostomium. Horst [11] distinctly remarks upon the fact that it is prolonged backward and divides the buccal lobe. Michaelsen uses the same character in his definition of the species [12] ("Kopf tanylobisch") and presumably from his own knowledge. Horst, furthermore, particularly points out that a drawing of mine of *P. posthuma* "is inaccurate and probably has been made after a badly preserved worm." I do not recollect now what were the characters of the example which furnished that drawing. But it is clear that the slender worms which present so close a likeness to *P. posthuma* have a prostomium exactly like that which I have figured. This was the case in a good many examples and, therefore, can not be merely a question of poor preservation.

In defining [13] the species *Pheretima posthuma* as well as in some earlier observations upon its structures, Michaelsen [14] emphatically records the presence of septum VIII/IX and the ab-

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[10] *Ann. & Mag. Nat. Hist.* (1883), V, 12, 214; *Ibid.* (1886), V, 17, 93. *Proc. Zool. Soc. London* (1886), 298; *Ibid.* (1890), 52.

[11] Earthworms from the Malay Archipelago in Zool. Ergebnisse, etc., Leiden (1892), 61.

[12] Oligochæta in Das Thierreich, Berlin (1900), 295. *Proc. Zool. Soc. London* (1890), Pl. V, fig. 11.

[13] Oligochæta in Das Thierreich, Berlin (1900).

[14] *Abhandl. Senck. naturf. Ges.*, 23, 201.

sence of septum IX/X, a condition which is precisely the reverse of that which obtains in most other species of the genus. I quite agree with him that septum VIII/IX is present; it was very obvious to me, although thin and delicate. I found, also, the septum lying between segments IX/X, which would be much less easily missed than the preceding, for it is much thicker than that which divides segments VIII/IX. It is to be remarked that in the present species, if it be a species, the 3 septa in front of the gizzard are much thicker than the slightly increased ones which follow the gizzard.

The intestinal cæca of the species *P. posthuma* appear to vary, being larger or smaller or even absent. It may be that here we really have a character which will separate true *P. posthuma* from those forms to which I have proposed here to give a new name; for in the individuals upon which I report in the present communication the cæca were small; finger-shaped, that is, not dwindling at the free extremity; and white, instead of brown like the intestine which is generally the case. The last pair of hearts is in segment XII.

The position and nature of the testicular sacs are known in *Pheretima posthuma.*[15] In the examples which I refer to an allied species here, these sacs were 2 pairs and in segments X, XI, as usual. The anterior pair of sacs, however, was very markedly smaller than the posterior pair and the 2 sacs on each side of the body were in close contact. Indeed, in the specimen dissected, the sac of the Xth segment on the left side was distinctly smaller than its fellow of the right side of the body. The testicular sacs of segment XI were very large. There were clearly 2 pairs of sperm-duct funnels. The sperm sacs, as in typical *P. posthuma,* were in segments XI and XII. The spermiducal glands of *P. posthuma* are spoken of as small ("Prostaten mit ziemlich kleinen Drüsentheil." Michaelsen). Those of the species now under consideration can not be so described, due regard being had to the slender build of the worms themselves. Each gland extended through quite 4 segments and this was the case in 2 individuals which I dissected. On the other hand, the duct seems to be, not unlike that of *P. posthuma,* but at the same time it may present differences. It is curved and S-shaped where it issues from the gland and until it makes a bend upon itself and runs directly backward toward the gland to open to the exterior without the intermediary of a bursa copulatrix.

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[15] See Cognetti di Martiis, *Boll. Mus. Zool. Torino* (1909), 24, No. 602.

The 4 pairs of spermathecæ appear to agree with the descriptions of those of *P. posthuma.* It is important to remark that while in an adult the diverticulum was fully as long as the pouch, it was distinctly shorter in an example not fully mature. Too much stress has been at times laid upon the relative lengths of the spermatheca and its diverticulum.

Pheretima americanorum sp. nov.

A single example of this, the finest new species contained in the collection, measured when alive according to the label 12 inches, about 30 centimeters. By its preservation it has shrunk to some 20 centimeters or so. The diameter at the head end is 8 millimeters. Thus the worm is a robust species and is of about the same dimensions as *Pheretima benguetensis,* another large species contained in this collection. Its color is peculiar. There appears to have been little or no integumental pigment during life, for the color of the preserved worm is almost white, somewhat of the tint of a fresh deal board, that is, a very pale brown. This color is hardly darker upon the clitellum. The most salient external characteristic is the one afforded by the genital papillæ, which are different from those of any other species hitherto described. The species which come nearest to the present in this particular are *Pheretima glandulosa* Rosa [16] and *P. papulosa* Rosa, [16] but there are obvious differences.

These papillæ are present in the neighborhood of the male pores upon the XVIIIth segment and of those of the spermathecal pores which lie between segments VI/VII, VII/VIII, VIII/IX. The papillæ themselves are minute, white warts, which contrast with the surrounding yellowish skin by their color as well as by being raised above its surface. Those belonging to the male pores are limited to the XVIIIth segment as in *Pheretima glandulosa* and do not extend to neighboring segments as they do in the other multipapillate species, *P. papulosa.* I have myself had the opportunity of studying *P. papulosa,*[17] but I do not recollect the exact appearance of the papillæ in that species. It is clear, however, that in *P. papulosa* they are also quite small. Those of *Pheretima americanorum* are heaped around the male pores and especially on that side which lies nearest to the mid-ventral line of the body, but they occur on both sides of the external aperture of the spermiducal glands.

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[16] Both are described in *Ann. Mus. Civ. Genova* (2a) 16, 525, etc.

[17] *Proc. Zool. Soc. London* (1900), 644.

There must be at least 70 or 80 of them and they are partly disposed in a series of curves internal to each other upon the inner side of the orifice of the spermiducal glands; now and then these papillæ are not very easily distinguishable from the skin which they cover. Precisely similar, though less numerous, papillæ occur close to the spermathecal pores, and in this case they cover a portion of the skin both anterior and posterior to the orifice of the spermatheca. Here the papillæ are more numerous in the case of the posterior spermathecal pores and less numerous around the anterior pair of spermathecal pores. I have dealt with the genital papillæ before the other external characters since they are the most obvious of those characters and of themselves serve to distinguish this species from any other.

The setæ of this species form completely closed circles around each segment (except of course, the Ist), without any trace of either a dorsal or a ventral gap. The setæ of the anterior segments are not larger than of those which follow; nor is there any increase in size, or greater crowding together, of the ventrally situated setæ.

The clitellum occupies the whole of segments XIV—XVI and has complete circles of setæ upon each of these. The dorsal pores commence in XII/XIII and are not to be seen upon the clitellum.

The oviducal pore is upon a rhomboid area of which the middle is traversed by the line of setæ of segment XIV. The male pores are not very far apart and are separated by 6 or 7 setæ.

The spermathecal pores are 3 pairs on VI/VII—VIII/IX.

Some of the intersegmental septa are considerably thickened in this species. I recognize 4 septa in front of the gizzard, all of which are rather thick and much interconnected by slips of muscle as is very commonly the case in large earthworms. The gizzard-septa themselves are absent in those septa which should separate segments VIII/IX and IX/X. The following 4 septa are thickened and also much bound to each other by tendinous-looking threads. With reference to the vascular system, I have noticed that the dorsal vessel becomes suddenly much increased in caliber in segment XIII, reckoning from behind forward, the presumed direction of the blood current. The last pair of hearts is in segment XIII; these hearts, like the 2 preceding pairs are of large caliber, greater than those of the Xth segment.

The large intestine begins in segment XV and there is a pair of cæca extending through 3 segments.

That section of the œsophagus which immediately follows the gizzard and lies in segments X, XI, XII, and perhaps XIII, is very vascular and has thick walls; it evidently corresponds to the region which in other earthworms is furnished with those glandular outgrowths known as calciferous glands. The gizzard is well developed and shows nothing remarkable in its form.

The spermathecæ are 3 pairs and lie in segments VII, VIII, IX, opening as already stated. They are long and oval, measuring 5 millimeters in length, and have a short, but perfectly distinct, muscular duct. The diverticulum has a slender duct and long, oval, swollen extremity; it is of about one-half the length of the pouch.

The ovaries are large and lie in segment XIII. Well above each is a longish narrower ovisac.

The testicular sacs of this representative of the genus are remarkable. Attached to the front of the wall separating segments X, XI, that is, lying in segment X, is a smallish, irregularly spherical sac which I identify with the anterior testicular sac from its position and general relations. From the opposite side of the septum, that is, in the VIth segment, the sperm duct could be clearly seen running from the septum on to the ventral parietes. Shortly after leaving the posterior face of septum X/XI, a slender tube was seen to leave the sperm duct, to swell out into a lateral, circular diverticulum, and then to join the testicular sac affixed to the posterior wall of segment XI. This tube, widened in the way described, is evidently the connection between the two successive testicular sacs of segments X and XI. These sacs are well known to be connected in certain species of earthworms, such as *Pheretima montana* (according to Ude),[18] and not to be so connected in others; for example, *P. benguetensis*, described in the present memoir.

The mode of connection seen in *P. americanorum* is quite unusual in the genus and, I think, at present unique. It should be explained that the delicate tube which appears to leave the sperm duct and which communicates with the testicular sac of segment XI is not a diverticulum of the sperm duct. Although I have not made a microscopical examination of these parts, I presume that the tube merely envelopes the sperm duct and is an outgrowth from the testicular sac of segment X.

The sperm sacs of this species are 2 pairs and lie in segments X and XI. They are somewhat tongue-shaped, and arise from a very narrow stalk which is easily broken and may be seen to communicate with the testicular sac by a narrow orifice. Each sperm sac is prolonged distally into a very narrow appendix, which arises abruptly from the rather squared end of the main part of the sac. The arrangement, in fact, is very like that in many other species of *Pheretima,* including *P. decipiens* described in the present paper.

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[18] *Ztschr. f. wiss. Zool.* (1905), 83, 477, fig. 4.

It is important to note that the two sperm ducts of each side join shortly behind the septum dividing segments XI and XII.

The spermiducal glands of *P. americanorum* are large and extend through segments XVI—XXII. They appear to me to be primarily divisible into 3 large lobes; but in any case, they are greatly subdivided into small lobes of unequal size. The gland, however, is solid, the lobes being close together and not separated by much interstitial tissue. The duct of the gland is moderately thick, and arises from about the middle of the gland. It runs a perfectly straight course to its external orifice, a course transverse to the long axis of the body of the worm. The duct of the spermiducal gland does not vary in width through its course. The external appearance of the genital area gave me the impression that there would prove to be a bursa copulatrix. However, there is nothing of the kind in this species. The spermiducal gland measures 11.5 millimeters in length.

ILLUSTRATIONS.

(Drawings by W. S. Berridge.)

PLATE I.

FIG. 1. *Pheretima benguetensis* sp. nov.
2. *Pheretima orientalis* sp. nov.
3. *Pheretima albobrunnea* sp. nov.
4. *Pheretima americanorum* sp. nov.

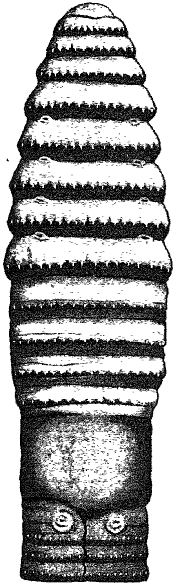

Fig. 1.

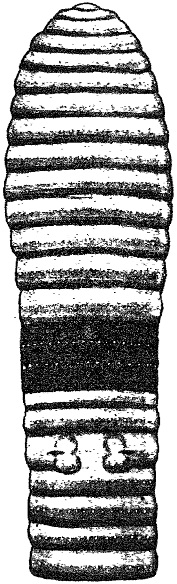

Fig. 2.

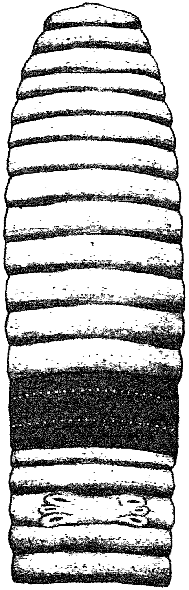

Fig. 3.

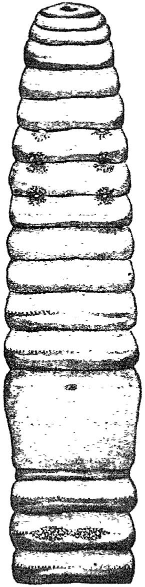

Fig. 4.

PLATE I. FOUR NEW SPECIES OF PHILIPPINE EARTHWORMS.

REVIEWS.

A Monograph of the Anopheline Mosquitoes of India. By S. P. James, M. D., D. P. H., I M. S., and W. Glen Liston, M. D., D. P. H., I. M. S., Second Edition. Re-written and enlarged. Calcutta: Thacker, Spink and Co., 1911. 4to. pp. 1–128. 36 plates. 17 text-figures. Price $6.25.

The avowed purpose of this work is that of "describing the different species in such a manner that any specimen collected will be easily identified as this is the most important requirement of any book dealing with mosquitoes."

As this book is prepared ostensibly for the use of physicians and practical sanitarians, we may therefore overlook with some propriety the fact that in so far as classification is concerned the work is supposed to deal with female mosquitoes exclusively.

Had the authors stopped at "describing the different species in such manner that any specimen collected [might] be easily identified," their work would have been less liable to adverse criticism by systematists, but they, like so many medical men not trained in systematic zoölogy, have attempted to dabble in generic legerdemain, thereby increasing the confusion already present in culicid classification and adding to the burden of synonymy which must be borne, not by men of their profession, but by the already incumbered entomologist.

Chapter I deals with a general account of mosquitoes. It contains many inaccuracies, which, while known to be such by technical men, are liable to mislead, as for example (page 1): "the eggs float on the water *for some days* (two or four) after which time they hatch." Experience in the Philippines shows that *Culex fatigans* eggs hatch, *as a rule* within twenty-four hours, so that one to four or more days would have been more accurate.

The males of mosquitoes do not possess a *piercing* proboscis.

The proboscis in the Megarhininae is *not* bent *back* but bent toward the venter.

Every observation (of several hundreds) made on the members of the genus *Culex* in these Islands goes to show that the eggs are laid by the female *directly* upon the water singly and adhere to each other by their sides (not edges) and that they are not collected together in a raft *before* deposition. Neither does the female allow the egg-raft to drop into the water. All Culicidae, so far observed, lay their eggs *directly* upon the surface or upon the moist portion of containers directly above the water surface, in which latter case the eggs adhere to this surface until the larvæ hatch. This may not, however, have been the experience of these authors.

No portion of the individual eggs, in an egg-raft, is submerged[1] as stated on page 5.

The palmate hairs of Anophelinae larvæ and others are more nearly like the leaf of *Livistona spp.* than that of the coconut palm. They are not limited to the larvæ of Anophelinae (p. 6), being found upon the larvæ of *Aedeomyia squammipenna* Arrib.

Few mosquitoes have a straight proboscis, it being usually slightly double curved or S-shaped (p. 11).

The prothoracic lobes of mosquitoes are not *patagia*, nor is the thorax "mainly composed" of a middle division or mesothorax, the other portions being as necessary to its structure as this (p. 11).

The terms *tergite* and *sternite* are the correct ones to use in connection with the abdominal sclerites of insects. The anus opens on the dorso-caudal surface and not the ventral surface of the last abdominal segment (p. 12).

The relative lengths of the first submarginal and the second posterior cells of the wings of Culicidae are of generic and family as well as of specific importance (p. 13).

Why change the nomenclature of the wing veins, producing such unwarranted innovations as: "The most important of these *transverse* veins is the subcostal," when Theobald and others define the subcostal as a longitudinal and not a transverse vein? (p. 13).

Cordate and obcordate are terms more uniform with ovate, obovate, oblanceolate, etc., than are cordiform and obcordiform. The idea of using these terms to designate scale forms in insects is an excellent one.

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[1] *Vide* Banks, *This Journal, Sec. A* (1908), 3, 251, Pl. 8, fig. 2.

It is not true that all larvae of the genus *Culex* have *long, thin* respiratory siphons as e. g. *C. fatigans.*

How is it possible for scale shapes to be of both *generic* and *specific* importance to entomologists?

Of course such a juggling with scientific names as that on page 18 is obviously not permissible, *maculipalpis* James & Liston and *nigerrimus* James & Liston being entirely untenable.

The directions for collecting mosquitoes, given in Chapter II, are very good, but the method of mounting on disks is antiquated, slovenly, and entirely unsatisfactory when the worker desires to examine the ventral surface of the specimen. It is slovenly because by passing a pin through the thorax it is impossible to avoid removing scales which are important in classification. That method describing the use of cork or pith is much more satisfactory in every respect and it alone should have been given.

On page 11 "upright forked scales" is criticized and the expression is then used on page 28 and repeatedly elsewhere, an obvious inconsistency.

The prothoracic lobes are spoken of on page 30 as if they were appendages rather than a part of the thorax itself.

The term *promontory* as used on page 40 and elsewhere is not entomological.

Nyssomyzomyia as a substitute for *Pseudomyzomyia,* on pages 43 and 44, is assuredly an unwarranted innovation in systematic entomology.

May we be delivered from the necessity of a subgenus as intimated in the footnote on page 46!

On page 49 we have *Myzorhynchus nigerrimus* James & Liston and *M. nigerrimus* Giles! On page 54 we are told that this species, that is, *M. nigerrimus* James & Liston is *sinensis!* Could there be anything more beautifully systematic than this?

To pick out all the anomalies and absurdities of classification would lengthen too greatly this already lengthy review.

Suffice it to say that such an attempt as Messrs. James and Liston have made should never be undertaken under the limited conditions of inaccessibility to large collections and extensive literature which must have been theirs in the preparation of their book. It had been far better to give merely descriptions, leaving systematic work to that future Alexander who might cut the Gordian knot into which the classification of the Culicidae is tied.

Several inaccuracies and inconsistencies in orthography occur as, for example, the spelling of *ludlowii* and *rossii* with one or two terminal vowels; on the same page (105), Philippine Islands with two *l*'s, and the absence of the second "e" in *Wiedemann,* together with several others.

The larval characters and habits of *Myzomyia ludlowii* Theob., *rossii* Giles, were described in detail in 1907 and 1908[2] though Messrs. James & Liston have stated on page 104 that they are not known. Possibly this remark has reference to *M. indefinita* which is hardly to be considered a valid species.

Most of the illustrations are very good, especially the line plates and text figures, but the color of the "coloured" plates is, to say the least, bizarre, while figures like those on page 8 should never be allowed to appear in any text.

There is no doubt that a very honest attempt has been made in this book to give a means of assistance to hundreds of non-technical men, but clarity and exactness should hardly be sacrificed to popularity in a publication which bears the hall marks of a scientific contribution.

Aside from the unfortunate selection of a color for the plate paper, the general appearance of the book is good.

C. S. B.

Who's Who in Science (International) 1912. Edited by H. H. Stephenson. New York. The Macmillan Company. Cloth. Pp. XVI+335. Price $2.

Aside from the preface and the contents, this book consists of six parts; namely, abbreviations, obituary for 1911, the world's universities, biographies, supplementary list, and classified index.

The first three parts will be useful, while the fourth, biographies, is the major part of the book and should be of great service to librarians, editors, and scientists. In this part the names of scientific men are arranged alphabetically with degrees, places of birth and education, address, past and present positions held, publications, and lines of present interest and research.

The supplementary list covers less than two pages and contains some names omitted from the main list.

In compiling this list the author restricts science to the natural and applied sciences, excluding the sometimes so-called sciences of economics, sociology, psychology, education, and exploration.

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[2] *This Journal, Sec. B* (1907), 2, 513, *Sec. B* (1908), 3, 335.

The chief fault of this book is its incompleteness. As an example; under zoölogy, but 116 names are recorded for the United States and in several branches of work some of the most prominent men are omitted. These facts lead the reviewer to suspect that the same fault exists with regard to other sciences.

The classified index is a useful one. Here the bare names are arranged under subjects and countries.

The book is well planned and the mechanical work is excellent. The names are set in Clarendon capitals which distinguishes them clearly from the balance of the text. The printing is perfect, the paper is light and dull, and the book is neatly bound in dark crimson cloth.

R. C. McG.

THE PHILIPPINE
JOURNAL OF SCIENCE
D. GENERAL BIOLOGY, ETHNOLOGY
AND ANTHROPOLOGY

VOL. VII AUGUST, 1912 No. 4

THE STONE INDUSTRY AT SAN ESTEBAN, ILOKOS SUR.

By EMERSON BREWER CHRISTIE.
(From the Division of Ethnology, Bureau of Science, Manila, P. I.)

At San Esteban, Ilokos Sur, an industry exists which, because of its possibilities, is not without interest. I refer to the business of working stone found in that municipality.

I have been unable to find any records referring to the beginnings of the industry. It seems certain, from statements made to me by the oldest workers, that it was in existence sixty years ago. Available statistics of the industry go back to 1906. In that year a licensing and taxing system was put in force which compelled the keeping by the municipal treasurer of books in which is entered the amount of tax paid on stone articles manufactured, levied at the rate of 10 per cent of the local value. The record applies only to the products of the quarries which are situated on government land. No record is kept of the sales of filters, the stone for which is brought up from the bottom of the Bay of San Esteban. Moreover, for the period from January 4, 1908, to April 10, 1910, inclusive, no entries referring to stone appear on the books of the municipal treasurer, for the reason, according to the statements of the municipal officials, that during that period no attempt was made to collect the tax on stone products. Thus figures on the industry are available only for the following periods: July, 1906, to January 3, 1908, and from

April 11, 1910, to November, 1911, inclusive. At the present writing (December, 1911), figures for December, 1911, have not yet been entered.

The books of the municipal treasurer show that from July, 1906, to the end of that year no stone products were sold. In 1907, 325 pesos[1] worth was sold. For 1908, there is only one entry, that for January 3, which shows that on that date the tax was collected on sales amounting to 105 pesos. In 1910, the tax was paid on sales aggregating 1,230.90 pesos. In the first eleven months of 1911 the sales amounted to 416.40 pesos. Work has been somewhat vigorously carried on during the present month (December, 1911), and the books may show at the end of the year sales amounting to two or three hundred pesos during this month.

Incomplete as they are, the preceding figures suffice to show that the San Esteban stone industry is at present of slight commercial importance. It is claimed by the workers that before the insurrection it was in a greater state of prosperity owing to a much better demand for San Esteban paving stones. Whether that statement be true or not, it is certain that the present amount of business is a small fraction of that which the supply of stone at San Esteban renders possible.

Before proceeding to a description of the various stone articles made at San Esteban, it may be useful to say a few words concerning the men who do the work.

THE STONECUTTERS.

As far as I know, there are but four men at San Esteban who make filters. These men are primarily fishermen, and make filters only as a by-occupation. Their total output for a year is not more than one or two dozen. The filters are made one or two at a time, in the yard or house of one of the men, where they lie until someone buys them. Sometimes they are made to order.

On the other hand, the men who work the quarries are numerous. But most of the stonecutters do only a few pesos worth of stone work in a year. They do not think it worth while for each man to take out a license from the Bureau of Forestry, and another one, for which the charge is 2 pesos, from the Bureau of Internal Revenue. Therefore, by common consent, only one of their number takes out the licenses, and all dealings with the treasury are carried on through him. This man keeps a list of the men who wish to cut stone during his holding of the license. He also has a written agreement with many of the workers to the effect that they will report to him the case of any man they catch trying to defraud the Government of the amount of the tax on sales. Whenever an article made by any of the men is sold, the fact must be made known to the licensee, who keeps an account of sales and settles with the municipal treasurer at convenient intervals.

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[1] One peso Philippine currency is equal to 50 cents United States currency.

At the present writing there are on the licensee's list of stone workers 62 names. Examination of the municipal treasurer's books showed that 36, or over one-half, of these men own agricultural land in San Esteban. All but 10 of the remainder are said to own land also, either in some other town, or in conjunction with some relative in whose name the land is recorded. Ten of the workers own land appraised at 200 pesos or over in San Esteban. The majority of the landowners among the stonecutters own but a small piece, which is insufficient for their needs. Out of the 62 stone workers, 8 are in the habit of going to Pangasinan annually for the rice harvest, spending two or three months on the trip. One is in the habit of going to Kagayan for the same purpose. Both the landless men and those who own but a small piece are accustomed to work a part of the time for local farmers for wages or on shares.

Moreover, almost without exception, the stone workers are fishermen. Some wade about near shore with small nets. Others go out on small rafts from which they catch fish, usually with hook and line, but sometimes also with nets. Nets and rafts are made by themselves. The quarry-workers do not as a rule sell fish. They only fish enough to supply their own families.

It is obvious from these statements that none of the stone workers is a specialist. They divide their time between at least three means of livelihood; fishing, stone-working, and farming; the last is their habitual and most important employment. Stone-working is a mere by-occupation for slack times with almost all. Two or three men like it and have attained more skill than the others. The great majority prefer to farm when they can.

THE DISTRIBUTION OF THE PRODUCT.

The distribution of the product is effected with the same slackness as the production. It may almost be said that the workers pay no attention to it. There is at San Esteban no public market, nor is there any other place where a stock of stone articles is kept for sale. I know of only one person in the town who might be called a broker or middleman in disposing of stone articles. This is a decrepit old woman, widow of a stone worker, who is reported to have done at one time a considerable trade in paving stones from San Esteban. Her business is said to have greatly fallen off because of the slackness of the demand for these articles. She is said in times past to have sent sailing vessels loaded with them to Vigan and Manila.

Occasionally a buyer comes to San Esteban with the intention of purchasing stone articles to the value of 50 or 100 pesos, but in such cases he usually has to wait in the town for two or three weeks until the workers have made the required amount. No one keeps a large stock on hand. During the past four months two men have come to the town to buy stone articles wholesale. One was a man from Narvakan, Ilokos Sur, who is reported to buy 50 pesos worth of mortars annually. This year it is said that he intends to take them by boat to Zambales Province. The other was a man from Pangasinan, whose usual business is said to be horse-dealing. I was told that he purchased between 100 and 150 pesos worth of mortars. Each of these men had to wait two or three weeks for the order to be filled. Sometimes a San Esteban man who is going to Pangasinan to work in the rice-fields takes one or two rice-mortars with him for sale, and there have been cases of corn-mills being taken by San Esteban men to Kagayan. If hearsay is to be believed, small sailing vessels are sometimes sent down the coast with cargoes of stone, but as far as I know, aside from the old woman mentioned above, no one makes a business of disposing of the stone products of San Esteban.

Stonecutters at San Esteban are not in the habit of working for wages. When a man's other work is slack, he makes an article or two, the stone for which is brought to his house, where he can work at it intermittently. On completion, the articles are left lying around the yard until a purchaser comes along. When a wholesale buyer, that is, a man who wishes to spend from 50 to 100 pesos, comes to the town, he passes the word around that he wants to buy such and such articles, and those are made and brought to him by the workers until he has enough. He often advances part of the price to men who state that they will bring him their work. Sometimes he gives a present of a peso or two to the most influential man among the stone workers for the sake of his influence with the others.

TOOLS USED BY THE WORKERS.

The filter-makers use the following tools in their work:

Chisels. Usually purchased from quarry workers.

Crowbar. Not much used, a bar of wood being often used. Purchased.

Hatchet or *ax.* Purchased.

Bolo. Made by Iloko smiths of Santa, Ilokos Sur. Either purchased direct or from peddlers.

The quarry workers do their work with the following tools:

Chisels. These are of various sizes and shapes, some ending in a point, others in a cutting edge. The steel for these implements is bought in bars by the workers. These are then cut to the required lengths, and tempered by some of the men themselves. Two or three smithies for making and sharpening tools exist in San Esteban under the houses of stone workers. The equipment consists of a bellows, made of two hollow cylinders of wood fitted with pistons headed with cock's feathers, a hollow scooped out in the ground for a charcoal fire, one or two pairs of pincers, a stone trough for water, and a rude anvil.

Wedges. These are obtained in the same manner as the chisels.

Hammers. A stone worker usually has two of these, a large one used as a sledge-hammer and a small one used to drive the chisels. Both kinds are usually purchased from Iloko smiths of Santa, Ilokos Sur, although several of the stone workers claim to be able to make them for themselves.

Hatchet. Secured by purchase.

Crowbar. Either bought ready-made or fashioned from a bar by the stone workers.

No explosives are used by the stone workers.

SITUATION OF QUARRIES.

The situation of the quarries with reference to the harbor of San Esteban and the main north-and-south highway is of importance in estimating the possibilities of this stone industry. Stone for various purposes may be obtained in numerous localities within the boundaries of the municipality, but the only quarries in use at present are the following:

Mabuyag.—This is the most conveniently located quarry, and is probably the most used. It lies on the western face of a hill about 35 kilometers south of Vigan, and about 2 kilometers north of the *presidencia* of San Esteban. It lies almost immediately on the main north-and-south highway which passes through San Esteban, on its eastern side. The harbor of San Esteban is about 2 kilometers from the place, and a good hard road passes within a short distance of the beach. Mabuyag furnishes stone suitable for all the staple products of San Esteban, namely rice mortars, paving stones, and hand-mills for rice and corn. Stones suitable for ordinary paving blocks, of about 25 by 18 by 5 centimeters, lie about on the surface in considerable abundance, requiring but little labor to dress into commercial form. Stone for mills and mortars, as well as that intended for large paving stones, has to be cut out of the solid rock. This is exposed vertically along a considerable distance, in strata of marked dip and various thicknesses.

Kappakappa.—This is the name of a *barrio* and adjacent locality situated 2.2 kilometers to the eastward of the *presidencia* of San Esteban. Following the present paths and road, it is about 3 kilometers from the harbor beach—perhaps a little more. It suffers from the disadvantage that to reach it from the coast one must follow a steep path through hilly country practically all the way. The men who get stone here carry it down to San Esteban on their shoulders or on carabao sleds. It is, nevertheless, used a good deal as a source of stone, especially of that intended for rice-mortars and hand-mills. The reason seems to be that the stone for this purpose is not only very abundant, but somewhat easier to get out than at Mabuyag, owing apparently to the existence of large detached pieces of rock at or just below the surface. It is claimed, moreover, that the stone here is a little finer-grained than that at Mabuyag. The quarries of Kappakappa lie along the eastern base of a ridge running approximately north and south. Almost anywhere along this base, for a distance of about 2 kilometers northward from the village, serviceable stone can be secured. At the present time 3 quarries are in actual use, but there are some half a dozen former workings which could probably be reopened, if necessary. One of the workings in use is in the village of Kappakappa, and the other two are a little to the north of it. Around each place where stone has been taken out is a substantial pile of rejects which could be changed, with a little dressing, into medium-sized paving stones, if desired.

While Kappakappa and Mabuyag are the only localities exploited to any appreciable extent at present, there are two other localities in the municipality which deserve mention. One is Apatot. This is a *barrio* on the seashore about 2 kilometers southwest of the *presidencia* of San Esteban, and about the same distance from the harbor. On the low hill just eastward of the village is found an abundance of loose blocks of limestone lying about on the surface. This stone is of light color, and so soft that it is very easy to work. It is used to a slight extent for making small mortars for crushing spices and for breaking up betel-nut for the use of the aged. Communication between Apatot *barrio* and the harbor of San Esteban is by boat, by foot-path, and along the beach.

Ansad, the other place which deserves mention, is a *barrio* and locality about 2.4 kilometers to the southeast of the *presidencia* of San Esteban, and slightly farther from the harbor. At present no stone is being obtained there, but along the eastern slope of a ridge running approximately north and south just west of the village there exists an abundance of loose flat stones large enough to make paving stones of medium size with little labor of dressing. It is said by the people of San Esteban that some years ago, when there was a brisk demand for paving stones, a great many were obtained here. The appearance of part of the hillside, showing former workings, tends to corroborate this statement. The only communication between Ansad and San Esteban is by footpath the greater part of the way, but a trail passable for carabao sleds could easily be put through, if necessary.

ARTICLES MANUFACTURED.

Data on the proportion of different articles made are available only for the period from April 11, 1910, to the end of November, 1911. The values of articles sold during this period are shown in Table I.

TABLE I.—*Values of stone products of San Esteban.*

Year.	Article.	Value.	Total.
		Pesos.	*Pesos.*
1910	Paving stones	555.00	
1911[a]	do	174.00	729.00
1910	Mortars	670.50	
1911[a]	do	240.00	910.50
1910	Handmills	5.40	
1911[a]	do	2.40	7.80

[a] Eleven months.

Regarding the value of stone filters, no statistics exist.

It appears from the foregoing that the most important branch of the quarry work at San Esteban is at present the making of rice mortars; the second in importance, that of making paving stones. Probably the value of the stone filters made, owing to the comparatively high price of these articles, has been greater during the past two years than that of the handmills. I propose to give a brief description of these four classes of articles as made at San Esteban, and of the procedure in making them.

FILTERS.

It is reported that formerly material for these articles could be found on the beach, but at present the makers get it from the bottom of the Bay of San Esteban. It is said that it is obtained sometimes at a depth of 6 or 7 meters. According to my own observation, added to the best reports I could get, it is not necessary usually to go deeper than 3 or 4 meters. The procedure is as follows:

A party of men set out from shore, each on board of one of the small rafts (*rakit*) used by fishermen. The bottom is observed until a lump of stone suitable for the purpose is seen. Then one or two of the men dive with a stout bar to loosen the stone from the bottom. When the stone has been pried loose, one of the men dives with a rope which is passed around it. The free end of the rope is then fastened to a stout pole laid crosswise on two or three small rafts. A bar fastened to this pole enables the men to give the pole a few turns, winding in the rope and jerking the stone off the bottom whenever an obstacle is encountered. No attempt is made to land the stone on the rafts. By means of paddles and poles the rafts—now fastened together—are propelled to the shore, dragging the stone along the bottom. When shallow water is reached, the men get off the rafts and roll the stone up the beach where it is rough-hewn with an ax. After this it is rolled up into the yard or under the house of one of the workers. With ax and *bolo* the stone, which is very soft for some time after being taken from the water, is further shaped and smoothed. The maker now scratches two circles on the stone, one marking the outer and the other the inner circumference of the filter's rim. The chisel and hammer are now brought into play to hollow out the stone. The *bolo* is also freely used to shape, smoothe, and hollow the article until it is finished. To use the filter, it is only necessary to place it above a receptacle for water, to pour water into the filter, and allow it to find its way through the stone and drip below. The first two or three filterfuls are said to be salty. I do not know how effective this kind of filter is.

PAVING STONES.

Stone suitable for making paving stones of moderate size, that is, 25 centimeters square and under, can be picked up loose on the surface in abundance at several localities within the municipality. The first work is done on the spot or under the shade of a neighboring tree. For the finishing touches the slabs are often carried home. If the blocks are too thick, they are split by making a row of holes with chisel and hammer. Each slab is then shaped roughly by chipping off pieces with blows of a hammer. The stone is then further chipped with a chisel until it assumes commercial shape. No attempt is made to make the stone completely smooth, nor are the stones made of uniform size. Those in one lot may vary several centimeters in one dimension or another.

If the paving stones desired are large ones, for example, 100 by 50 centimeters, they must be split out of the solid rock. This is done by making holes with a chisel and driving steel wedges into them with a sledge-hammer. When the desired piece has been split out, it is pried up with a crowbar and lifted out by hand. The block is shaped roughly with a hammer and then removed to a shady place for finishing. The worker sits on the ground by the stone and chips with hammer and chisel, sometimes also with a hatchet, until the work is done. Exact uniformity in size is not attempted, so that in a lot of a dozen or so one will find variations in size of several centimeters.

Two men work together in splitting out the stone for large paving stones. The finishing is done by one.

RICE MORTARS.

The stone workers state that this is a newer article of trade than paving stones. If they may be believed, the selling of mortars by San Esteban people to other towns practically commenced within the last dozen years. It is certain that stone mortars from San Esteban are at present the usual implements for husking rice in the Iloko towns I have seen from Vigan to Kandon, and according to general report they are common in many other towns, not only in Ilokos Sur, but in Union and

Pangasinan. During the last few weeks a lot of about 50 is said to have been bought for transportation by sea to the Province of Zambales.

These husking mortars have the obvious advantage over wooden ones of greater durability. Moreover, nearly every user of them who had also used wooden mortars, and from whom I have made inquiries, declared that the work was more quickly accomplished with the San Esteban mortars. Some users went so far as to say that one-half the time was thus saved. This is probably an exaggerated way of expressing a real saving of time. Rice husking forms so large a part of the daily routine of a multitude of Filipino households that a mortar that will save time in this operation is of real importance to the community. The husking is done in stone mortars in the same way as in the wooden ones, by pounding with a heavy wooden pestle.

San Esteban rice mortars differ considerably in size and somewhat in style. They are roughly grouped by the makers into three classes, those weighing about 90 kilograms and under, those weighing about 115 kilograms, and those weighing 135 kilograms and over. Mortars weighing about 90 kilograms are the most popular; those weighing 110 to 115 are not uncommon; the largest ones are not extensively used. A mortar which I measured, which was typical except that it was larger than most, weighed 137 kilograms, and was of the following dimensions:

Dimension.	Cm.
Diameter at top, outside measurement,	53
Diameter at top, inside measurement,	45
Diameter at base	38
Height	53
Depth	25

The main difference of style in mortars is that in some the opening contracts gradually without a break to the bottom, while in others, the opening, after contracting uniformly to a point about halfway to the bottom, abruptly ceases to contract for several centimeters, until the bottom is almost reached. The lower half of the opening, therefore, forms a sort of pocket or deep bowl, with sides perpendicular for some distance. Quite a number of San Esteban mortars which I have seen in use were of the former type, while of nearly 70 new mortars, every one was of the latter style. The kind of mortar, therefore, in which there is an abrupt break in the contraction at a point about halfway to the bottom may be said to be the prevailing style at present.

The first step in making a rice mortar is splitting out the block of stone for it. This is accomplished by making holes with chisels and driving in wedges with a sledge-hammer. The block is then roughly trimmed with a hammer. The worker then scratches two concentric circles on the stone to mark the inner and outer circumferences of the rim of the mortar. Thereafter he hollows the stone with hammer and chisel to the desired depth. Finally his hatchet is brought into use to give the finishing touches which require several hours. Protuberances are chipped off the sides; the upper part of the hollow of the mortar is also treated. When the article is finished, one notes the fine channels and ridges left by the hatchet around the rim and in the mortar as far as about halfway to the bottom. This hatchet work is often done at home, the maker sitting on the ground under his house or in a shady corner of his yard to do the work.

Besides the rice mortars, all of which are heavy, a few small mortars are occasionally made at San Esteban for pounding spices or crushing betel-nut for the aged. Sometimes these small mortars are made from the same stone as the rice mortars and sometimes from the lighter colored and very soft limestone found in the *barrio* of Apatot. In the latter case they are given a final smoothing by rubbing on a hard stone on which water is poured from time to time. These small mortars of Apatot limestone differ conspicuously from the bulk of San Esteban stone artifacts by their neatness and finish. The pestles are of stone.

CORN MILLS.

These are of two main varieties. Those of the common kind weigh, on the average, about 25 kilograms, though lighter ones are not unusual. A corn mill of this sort is made up of two stones, usually of about equal size and similar shape. The dimensions are commonly, for each stone, about 32 centimeters in diameter and 9 centimeters in thickness. The two stones are held together with a stick or peg which fits into a hole made at the center of each stone. The corn is fed through a hole in the upper stone. The upper stone is turned on the lower one by means of a stick which fits into the former near its edge.

The other style of corn mill is called at San Esteban the "Kagayan mill" because it is said to be an article of export to that province. It is not used to any appreciable extent by the San Esteban people and I have seen but one specimen, which may or may not have been typical. These mills are said to weigh usually about 50 kilograms. The one I saw was somewhat lighter. The upper and nether stones were of the same diameter, but the lower stone was 2 centimeters thinner than the upper. The upper stone had a sunken space on the surface into which the corn was poured and then worked through a hole onto the lower stone. The mill, beside being of greater size than those in common local use, differed in that the stick with which the upper stone was turned on the lower was thrust, not into the upper surface of the upper stone, but into a hole in its side, about half way between its upper and lower edges.

The reason for the difference in size between the corn mills made for local use and those intended for the Kagayan trade is said by the San Esteban people to be that the Kagayan people eat much corn and so want it ground fine, while the San Esteban people usually intend the corn they grind for fattening pigs.

RICE MILLS.

These articles, as made at San Esteban, vary in size and are roughly classified accordingly by the stone workers into "first" and "second" class. Most of the local product belongs to the latter. One which seemed fairly typical to me had the following dimensions:

Dimension.	Cm.
Diameter of upper stone	25
Thickness of upper stone	12
Diameter of nether stone	41
Thickness of nether stone	8
Length of spout (on nether stone)	10.5

It will be noted at once that the rice mill differs in appearance from the corn mills. The lower stone is much larger in circumference than the upper. The nether stone also has a deep groove or channel running around the lower edge of the upper stone, to receive the ground rice. This channel ends in a projecting piece which may be called a spout, through which the ground rice is removed. The upper stone is turned by means of a short bar thrust in a hole on its side and situated about halfway between the upper and lower edges of the stone. Rice mills are much used for grinding rice to be used as starch.

PROCESS OF MAKING MILLS.

Material for making small corn mills may often be picked up loose on the surface in San Esteban. That for the larger mills, whether for corn or rice, usually has to be split out of the rock. After the desired piece has been taken out by means of chisel holes, wedges, and prying with a crowbar, it is roughly shaped with a hammer. Then the maker, with the help of a chisel and a piece of string, scratches one or two circles to serve for his guidance in further shaping of the stone. He then proceeds with hammer and chisel to chip the stone to the shape desired. The finishing touches are usually given with a hatchet. By this means he not only gives a certain rough finish to the exterior of the mill, but makes small converging ridges on the inferior surface of the upper stone and the superior face of the nether one. This is believed by the makers to add to the efficiency of the mills.

OTHER ARTICLES.

Beside mortars, paving stones, and mills, which are the staple objects of the stone manufacture at San Esteban, the following articles are made:

Metates for crushing cacao. These are of various sizes. The few specimens which I have seen at San Esteban were made of single slabs of stone. The stone is chipped away in such a manner that the slab, as it lies on the floor, offers a sloping surface on which the cacao beans are crushed with a stone roller.

Threshing floors are also made of San Esteban stone. A few large slabs are set flat into the ground, forming a floor, while other slabs are set up on edge around its sides as a wall to prevent the grain from scattering. The rice in the ear, which comes from the field in large bunches, called *manojos,* tied with a bit of bark, bamboo, or other fastening, is laid on the floor and held down by the foot of the operator pressing on the straw, while he or she beats out the grain with the long heavy pestle used in husking rice. Threshing floors of San Esteban stone abound not only in that pueblo but in neighboring ones.

Feeding and watering troughs. These articles of San Esteban stone are very common there and in neighboring towns. They are of various shapes—square, oblong, oval, and round—and range in size from those holding a dozen liters or more to those holding a cupful and intended for poultry. Occasionally one is made with two compartments, one for food and one for water.

A San Esteban product which deserves mention, although it is no longer manufactured, is the stone cloth-polisher. The use of cotton cloth with a shiny finish for men's trousers went out of fashion among the Iloko people some years ago and the demand for stone cloth-polishers went with it, but while the fashion lasted, a number of these articles were made at San Esteban and exported to Narvakan, Vigan, San Vicente, and in all probability, to other towns. The Iloko word for the implement is *lid-lid-an*. It consists of a heavy stone, frequently not far from 200 kilograms in weight, whose shape can best be understood from the illustration (Plate V). The cloth to be treated is moistened and then wound on a roller. This roller is placed on a heavy board with a concave surface. The stone, the under side of which presents a flat rectangular surface, is then placed transversally on the roller. The operator steps upon the stone and by shifting his weight from one foot to the other gives a "seesaw" motion to the stone. The stone is also given a movement which takes it from one end of the roller to the other, and thus comes in contact with the whole width of the cloth. The illustration does not represent an actual operation. The man is posed to show the position taken by users of the *lid-lid-an*. In actual practise, the heavy concave board is partially sunk in the ground to keep it steady, and a hand-rail is set up on the right and left of the operator, on which he uses his hands to assist him in keeping his balance.

I have seen only one *lid-lid-an* in use. This was at Narvakan, Ilokos Sur. I have seen disused and neglected stone cloth polishers in San Vicente, Vigan, and San Esteban.

There is some reason to believe that the idea of the *lid-lid-an*, and perhaps even the first models, came to the Iloko country from China.[1]

PRICES OF MANUFACTURED ARTICLES.

In considering the possibilities of the San Esteban stone industry, the price at which the various articles have actually been sold there in 1910 and 1911 is worthy of attention.

Paving stones.—During the period from April 11, 1910, to the end of the year, these articles were sold at San Esteban to the number of 9,250, of an average weight of a little more than 4 kilograms each. The price was 6 pesos per hundred stones. In the first eleven months of 1911, 2,900 paving stones were sold, of an average weight of a little more than 7 kilograms apiece. The price was the same. As will be noted, the difference of a few kilograms in the weight of paving stones makes no difference in the price. Stones suitable for paving blocks 25 centimeters square and under can be picked up on or near the surface in abundance in San Esteban. But when the paving stones required are of such a size as to require their being split out of the solid rock, the price rises with a jump. For example, paving stones about 100 by 50 centimeters in size are said to sell for 80 pesos to 100 pesos per hundred.

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[1] Since this article was written I have seen in the number of the *National Geographic Magazine* for December, 1911, a reproduction of a photograph taken in the Province of Szechuan, China, which shows a stone cloth-polisher in use. This implement is identical in shape and manner of use with the *lid-lid-an*.

It should be stated that it is customary at San Esteban for the maker to transport articles intended for shipment to the beach without extra charge.

Mortars.—During the period April 11, 1910, to the end of the year, 447 rice mortars were sold, of an average weight of nearly 93 kilograms each. The average price was 1.50 pesos. During the first eleven months of 1911, the number sold was 160, the average weight nearly 91 kilograms, and the average price 1.50 pesos. This is what one usually has to pay at San Esteban for 90-kilogram mortars, although I have heard reports of a trader having obtained them cheaper. Those 25 kilograms heavier cost 2 pesos or 2.50 pesos apiece, while those of the heaviest class sell for 3 pesos.

Mills.—In 1910, 18 mills, and in 1911, 8 mills, appear on the books of the municipal treasurer as having been sold, at an average price of 30 centavos apiece. The weight and kind are not specified. These articles were probably rather light corn-mills of the sort in common local use. I know of no other records of sales of San Esteban mills. According to the most reliable information I could secure, one can not depend on buying corn mills of the local type at less than 50 centavos; the heavy corn mill called the "Kagayan mill" is worth locally from 1 peso to 1.50 pesos, and an ordinary rice mill, weighing in the neighborhood of 35 kilograms, 1.50 pesos.

Filters cost from 4 pesos to 9 pesos according to size.

SUMMARY.

The raw material, with the exception of that used for filters, is found on Government land; it appears to be abundant. Men who understand in a rude way the working of the local stone are present in fairly respectable numbers, but do not give more than a small fraction of their time to stone working. The San Esteban paving stone probably has been more in demand formerly than at present. Whether the demand will revive is a matter of conjecture.[2] The stone rice-mortars seem to have a wide-spread field of possible use in the Archipelago. The greatest impediments at present to the growth of the industry would seem to be the lack of facilities for distribution, such as some responsible person or firm through whom merchants at a distance could order articles, and the absence of any considerable stock of ready-made articles which could be drawn upon at any time.

[2] San Esteban stone of the kind used for mills, paving stones, and rice mortars is an impure limestone of a hardness of about 3.5. It is, therefore, too soft for use as paving material in places subject to heavy traffic.

ILLUSTRATIONS.

(Plate I from photographs by Christie; Plates II, III, IV, and V from photographs by Cortes.)

PLATE I.

FIG. 1. Application of finishing touches to rice mortar with hatchet.
2. Coral rock for making filter, being rolled toward the beach.

PLATE II.

FIG. 1. Inner surfaces of corn-mill, showing grooves. Diameter about one-eighth actual size.
2. Corn-mill, normal position. Diameter about one-seventh actual size.
3. Rice mortar. Diameter about one-tenth actual size.
4. Rice-mill, upper stone placed on edge, showing bowl for receiving rice and hole for its passage to the space between the stones. Diameter about one-tenth actual size.

PLATE III.

FIG. 1. Paving stone. Width about one-tenth actual size.
2. Filter. Width about one-tenth actual size.
3. Tobacco-beater. About one-fifth actual size.
4. Double-basined trough. About one-fourth actual size.

PLATE IV.

FIG. 1. *Metate.* Roller about one-seventh actual length.
2. *Metate,* under surface. Width about one-ninth actual size.
3. Candlestick, unfinished. About one-sixth actual size.
4. Candlesticks, finished. About one-sixth actual size.

PLATE V.

Positions taken in using the *lid-lid-an* or stone polisher. In actual use there would be a hand rest on each side of the standing figure.

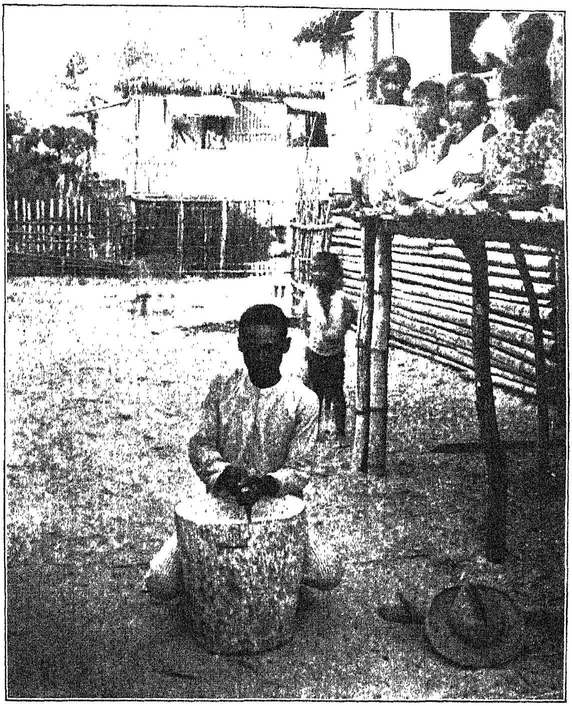

Fig. 1. Finishing a rice mortar.

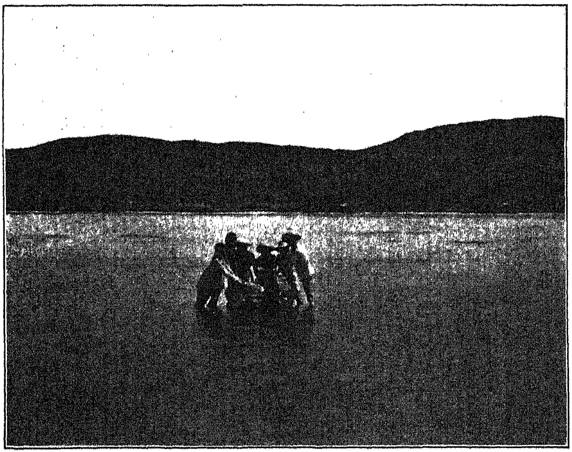

Fig. 2. Men rolling a piece of coral rock.

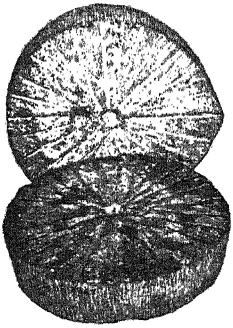

Fig. 1. Corn mill.

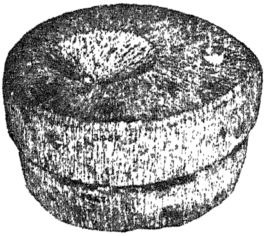

Fig. 2. Corn mill.

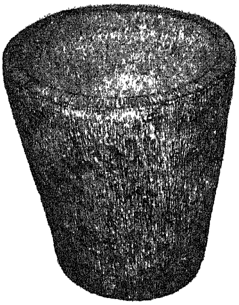

Fig. 3. Rice mortar.

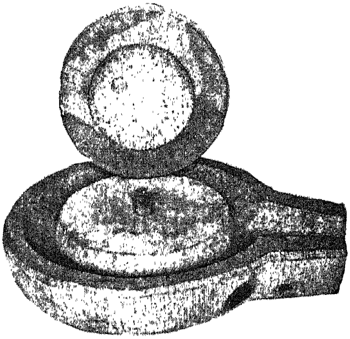

Fig. 4. Rice-mill.

PLATE II.

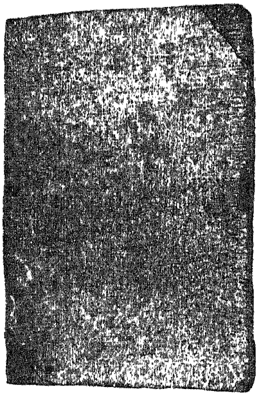

Fig. 1. Paving stone.

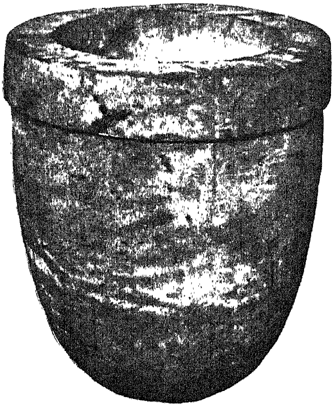

Fig. 2. Filter.

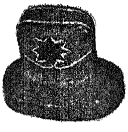

Fig. 3. Tobacco-beater.

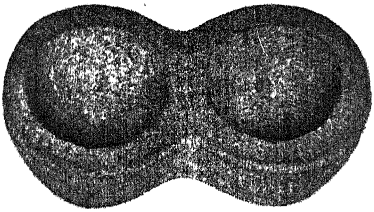

Fig. 4. Double-basined trough.

PLATE III.

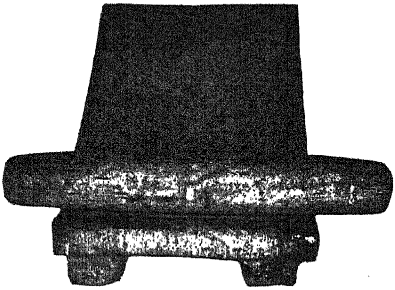

Fig. 1. Metate.

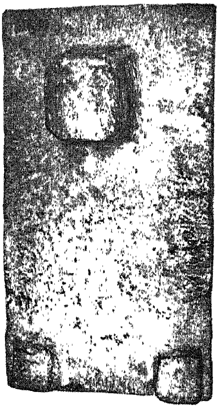

Fig. 2. Metate, under surface.

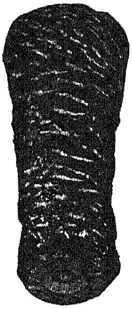

Fig. 3. Candle-stick, unfinished.

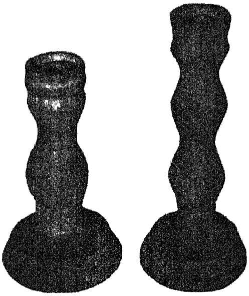

Fig. 4. Candle-sticks, finished.

PLATE IV.

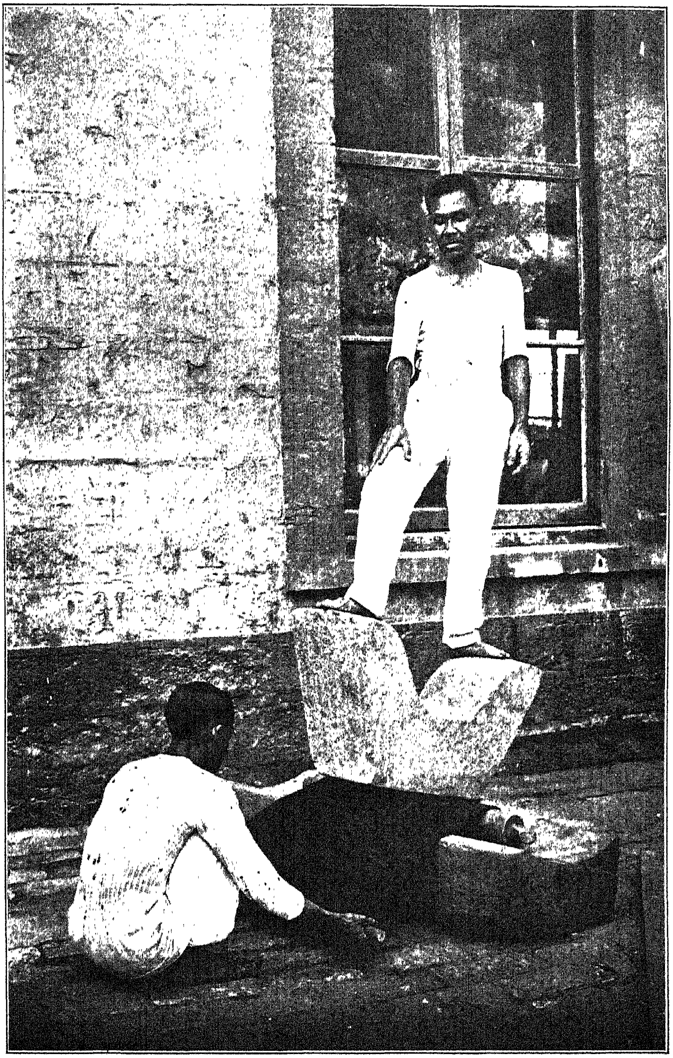

PLATE V. POSITIONS TAKEN IN USING THE STONE-POLISHER.

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NOTES ON THE WOOD-WORKING INDUSTRY OF SAN VICENTE, ILOKOS SUR.

By EMERSON BREWER CHRISTIE.

(From the Division of Ethnology, Bureau of Science, Manila, P. I.)

The town of San Vicente, Ilokos Sur, had, according to the census of 1903, about 6,000 inhabitants. Its lands are restricted in amount and poor in quality. Well-informed persons say that it is obliged to import the greater part of its rice supply from other towns. A good many of the people of the town are said to have emigrated; the rest are able to gain a livelihood only because of the existence of three industries; namely, weaving, salt making, and woodworking. I propose in these notes to deal with the last-named industry.

Woodworking at San Vicente is sufficiently advanced to have split up into the following specialties: carpenter work, the making of carved boxes, the manufacture of combs, the making of images, and furniture making.

CARPENTERING.

The carpenters who follow their trade as their exclusive means of livelihood number about 30 adult men. The minimum wage of a carpenter is 50 centavos[1] a day; skilful men are able to command 75 centavos and master carpenters (*maestros*) earn from 1 peso to 1.50 pesos per day. San Vicente itself offers practically no field to these men. Like a large proportion of the towns of Ilokos Sur it presents the external appearance of a stagnant or even decaying town; no building operations worth mentioning are going on. The carpenters, therefore, go to other towns to find work; frequently they are sent for. Vigan is within a very few kilometers, also Bantai, Santa Catalina, and Kawayan. Vigan is the largest of these towns and is the provincial capital. But San Vicente carpenters also go farther afield. They are in the habit of going to many towns within the province and even outside in prosecution of their work.

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[1] One peso (100 centavos) Philippine currency equals 50 cents United States currency.

There is nothing peculiar or noteworthy regarding San Vicente carpenters. The tools they use and the skill they exhibit are probably about the same as those of carpenters elsewhere in the Philippine provinces. An intelligent Filipino priest who has employed them on a church and *convento* states that he has found them timid about undertaking any large work, but teachable.

San Vicente carpenters have no union, but nevertheless make a very fair living. Master carpenters receive about twice as much pay as a municipal teacher or the president of their town, and, unlike the teachers, they can earn money all the year around. It is a current saying in San Vicente that a carpenter eats better than anyone else.

Carpentering in San Vicente is in most cases a hereditary occupation. A boy usually learns the trade by assisting his father. Occasionally, however, a boy whose father is not a carpenter becomes an apprentice to a carpenter. In such cases there does not seem to be any fixed term of service. The youth works for small pay until he has acquired a fair degree of skill; he then earns such wages as he can, which he keeps for himself.

CARVED BOXES.

The making of fancy boxes in this town offers an example of a minor industry suddenly stimulated into life by the American occupation. It is the consensus of testimony that before that epoch the output amounted to practically nothing. It is said that a few small carved boxes that were offered for sale to the American troops were sold so readily and at such good prices that a number of men gave themselves entirely to making them. At the present time the workers who give their whole time to making boxes number about a dozen, without counting several women who assist in the carving. Boxes, most of them small, bring into San Vicente about 1,000 pesos a year.

The work, like all other manufacturing industries of San Vicente, is a household industry. There is no separate building set aside for it. Most of the makers of boxes work at their own homes, either inside the house or in the yard. A few hire an assistant or two.

As regards division of labor it may be said that some persons make a box from beginning to end. Others only carry it through the earlier stages while another man—or woman—does the carving. In case assistants have to be hired, the compensation varies according to the kind of work done. A man who merely prepares the material and puts the box together receives about 40 centavos a day; a competent carver can command 75 centavos or even more.

The quality of the work leaves some things to be desired. The locks are ugly, dark, iron articles of Chinese manufacture, the hinges are unduly prominent, and the nails used are imperfectly concealed or not concealed at all.

The boxes usually made are small, varying in length from 15 to 30 centimeters, with a depth and width of about half as much. Large carved boxes, from 90 centimeters to 140 centimeters in length, are made to some extent usually to order. The two woods in common use for box making are *lanete* (*Wrightia* sp.) and *narra* (*Pterocarpus* sp.). The former is soft and nearly white; the latter is harder and always darker, although in the matter of color not all *narra* is alike. The designs are sometimes taken from Spanish or American catalogues of similar articles; sometimes they are furnished by a Filipino draftsman, who may or may not be himself a woodworker.

The material for making boxes is bought in the most expensive way. This statement applies also to all the wood manufactures of San Vicente. Each worker in the business does his buying independently of the others. He buys from time to time the small amount of wood which he can use wherever he can find it. Sometimes he gets it from a Vigan shop; sometimes he wanders about the country till he finds a suitable tree of the kind wanted, and buys it of the owner. In either case he brings to San Vicente only his own wood, when, in some cases, he could without any larger expenditure of time or money transport to his town enough for several woodworkers at the same time. In other words, there is none of the economy that comes from combination.

The disposal of the product is done in the same individualistic way. When the head of a family workshop has a dozen or two small boxes on hand he or one of his family usually goes on the road to peddle them. Vigan is the principal market at present.

Professional brokers in San Vicente manufactures of wood do not as yet exist, but there is reason to think that they are being developed. I know several men who at times buy boxes and other things by the dozen, advancing all or part of the price.

Some months ago a buyer for one of the largest department stores in the United States saw two boxes from San Vicente at the museum of the Bureau of Science in Manila, expressed satisfaction with the work and the price, and wished to communicate with some person or firm who could be depended upon to furnish him with a steady supply of the boxes at fixed prices. Neither the museum nor the provincial treasurer of Ilokos Sur knew of anyone to whom he could be referred, and San Vicente lost an opportunity to enter the American market. The absorbing capacity of the country about San Vicente for fancy boxes is very small, and the industry of making them will never be of importance, until trade connections are formed outside.

COMBS.

A good many thousand combs are made in San Vicente every year. A few are of carabao horn. The rest are of wood. The favorite material seems to be *kamagon* wood. The cheaper ones are made from the light-colored outer part of the wood; the more expensive ones are made from the very dark heartwood called by Americans "Philippine ebony." There are in San Vicente about a dozen comb-makers, and the town receives at least 1,000 pesos a year from the industry, probably more. Most of the combs are of the sort worn by women. The makers either work to order or take the combs to the market at Vigan. I have seen San Vicente combs in many towns of Ilokos Sur and Ilokos Norte, and they are said to be exported also to La Union, Nueva Vizcaya, Pangasinan, and Kagayan. Combs of this kind are a staple article in the Philippines and would seem to have a large potential market.

The process of making is simple. The wood is first barked and then sawed into convenient sections, which are next divided into small slabs. These slabs are dried over a smoldering fire of sawdust held in an earthen vessel. After this the outline of a comb, usually curved at the back, is drawn with a pencil; the small slab is then held fast in a vise while the teeth are formed with a saw. Finally the part of the slab outside the line marking the back of the comb is sawed away, and the comb is ready except for the polishing. The latter is sometimes done with a kind of leaf (*Ficus* sp.) possessing a rough surface, but more often with common sandpaper. The majority of combs are plain. Some are carved or engraved. The graving instrument may be a sharp, pointed knife, or a small graver's tool. There is one comb-maker in San Vicente who does better carving than any of his rivals. The tool which I saw him using for engraving was made of a section of an umbrella rib brought to a point.

Carabao horn is made into combs by sawing it into convenient sections and then proceeding as with wood, except, of course, that it is not placed over a fire.

Comb-makers of San Vicente pick up their material in a casual fashion wherever it is most convenient. Sometimes a trader or emigrant returning from Kagayan brings home a piece of *kamagon* wood which he sells to the workers. Sometimes they buy their supplies in Vigan. At times they run out of heartwood entirely and get along with inferior material until some chance gives them an opportunity to replenish their stock. The comb-makers can take care of themselves in a case of petty bargaining for a few combs, but none of them that I know has any broad-gauge business ideas. I do not know any one who could be called a comb-broker.

IMAGES.

The making of images is a more important industry at San Vicente than either the making of combs or of boxes. I know of nearly 20 image-makers in the town, without counting a number of persons who make a living by making the platforms and cars used for images. Probably the industry of making images brings to the town between 2,000 and 3,000 pesos annually. The work is commonly done to order; orders come from many towns in northern Luzon. Some images are intended for use in churches, but my impression is that the greater part of the work is for private individuals who wish a crucifix, a Madonna, or the figure of a saint to set up in their own homes. I have been told by several of the workers that the business is not as good as it was formerly, owing to Protestant and skeptical influences in recent years, but I can not vouch for the accuracy of these statements. In conjunction with the industry of making statues a very minor industry, that of making clothes for the figures, exists in the town. This is carried on by the women.

Several kinds of wood are used in the work, sometimes in the same statue. *Lanete* is perhaps the most common. There is naturally a wide difference in the quality of the output, from the painfully crude to the graceful. The illustration (Plate IV, fig. 1) shows the best piece of work which I saw going on. The artist received his training from a Filipino artist who used to live in Vigan. He used, to guide him, a small illustration in a catalogue of statues and other objects for devotional use. He used no models and made no drawings. The pieces of wood are marked with a pencil for sawing and chipping. After the image is roughly in shape, he trusts entirely to his eyes for guidance. He stated that glass eyes for statues were obtainable in Vigan; he, if I understood him aright, can make eyes out of glass. In his shop were a number of what resembled large wooden dolls without arms, which could be made into statues of various saints by additional touches and by affixing arms in various attitudes. The statue in the illustration was made partly hollow to lessen the weight.

Most of the San Vicente work in wooden statuary is crude. The head, arms, and trunk in a large statue are usually made of separate pieces of wood. I saw one statue of Christ, alleged to have been made in San Vicente, the hair of which, I was informed, was made of dyed maguey fiber, the eyelashes of cat fur, and the eyes of glass, while the representation of the crown of thorns seemed to me to be made of tin. The statue was thickly painted, splashes of red representing the blood.

CHAIRS AND OTHER FURNITURE.

San Vicente contains men capable of acceptable work in carving doors (Plate II, fig. 1) and other fittings for a house. There are also men who make carved wardrobes and beds to order. But the principal articles of wood made at San Vicente are chairs. About 5,000 pesos worth of these are sold by San Vicente workers annually. Sales of beds, tables, and wardrobes together amount to only about 1,000 pesos.

Chair making is carried on at the houses of the people, but it is common to hire a few outsiders to assist in the work. The largest number that I saw employed at any one place was ten. The work is somewhat specialized, but there is as yet no division of labor. There are men, for example, who make and put together all parts of a chair; there are more who do only certain parts of the work. The splitting of the rattan for the seats is usually intrusted to some one man of special skill at that kind of work, who is not expected to do anything else. He is paid 50 centavos a day, while planers and sawyers get only 2 pesos per week of six working days. The weaving of the rattan in the seats is usually done by women and children, who for their work on ordinary chairs receive 4 or 5 centavos per chair. They average 5 chairs a day. The man who puts the chairs together is sometimes a specialist in the work. He gets 40 centavos a day. The commonest class of chairs is sold locally at from 12 to 14 pesos a dozen, if the sale is a free one. When a man advances the money to the manufacturer, he gets a reduction in price. The amount of this reduction is variable, and may be as much as one-third.

I found it difficult to determine the amount of profit which there is in making chairs, as the statements of many of the workers seemed intended to mislead. To the best of my judgment, the wood in a chair of the ordinary sort, if *palo maria*[2] is used, costs, laid down at the place of manufacture, about 15 centavos. The rattan for the seat costs about 5 centavos. With the average grade of management which prevails at San Vicente, a chair of this kind costs the manufacturer, if he does none of the work himself, between 70 and 80 centavos, allowing nothing for the use of the place of manufacture, which is the ground floor and yard of his house.

There is no uniformity in the manner of disposing of the manufactured articles. I know of several men who sometimes advance money to the manufacturers and get their money back in chairs. One of these men is at present trying to make furniture brokerage a regular business—I do not know with how much success.

If a manufacturer has enough capital to be able to get on without advances of money, he either disposes of his goods in person or engages some one to take them on a peddling tour. The peddling is either done from an ox cart, or the goods are taken to Kagayan or Pangasinan by sea. Naturally, the farther the chairs are taken from San Vicente, the more is charged for them. But probably the system most commonly used is for the consumer to send an order directly to the manufacturer.

The material is sometimes bought ready dressed from dealers in Vigan. More commonly the manufacturer or a member of his household sets out on the road and buys the first tree that suits his purpose. A good deal of the *palo maria* used in San Vicente comes from the towns of Lapog and Maksiñggal. *Narra,* the only other wood used at all commonly by San Vicente chairmakers, is usually bought ready dressed in Vigan.

The situation of the woodworking industry of San Vicente may be summed up as follows: There exists here a considerable body of men, numbering perhaps as many as 125—excluding carpenters—who are professional workers in wood. These men do an annual business of not less than 10,000 pesos. This number does not include a good many other men who know something of the industry and turn their hands to it at odd times. The industry is entirely unorganized at the buying end, and nearly so at the selling end. The work is done entirely by hand. I do not know of any cheap and abundant supply of material in the neighborhood, nor of any other circumstance in favor of San Vicente as a woodworking center. The condition of the whole body of workers would probably be much improved if the majority of them emigrated to more favorable localities, a few dozen remaining to take care of the trade which has already been built up in the town.

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[2] *Calophyllum* sp., Iloko name, *bitaug,* pronounced as three syllables.

ILLUSTRATIONS.

PLATE I.

FIG. 1. Models used in making chairs. (Photograph by Christie.)
2. Tools used in making furniture. (Photograph by Christie.)
3. Combs at different stages of manufacture. The row of five at the extreme right are of carabao horn. (Photograph by Cortes.)
4. Typical small boxes. (Photograph by Cortes.)

PLATE II.

FIG. 1. Carved doors, San Vicente. (Photograph by Christie.)
2. Chair-maker at work. (Photograph by Christie.)

PLATE III.

FIG. 1. Man preparing rattan for use in making furniture. (Photograph by Christie.)
2. Girl putting the rattan seat and back in a chair. (Photograph by Christie.)
3. Men making a bed. (Photograph by Christie.)

PLATE IV.

FIG. 1. Wood carver finishing a wooden statue. (Photograph by Christie.)
2. Sawyers at work. (Photograph by Christie.)
3. Carts loaded with San Vicente furniture. (Photograph by Christie.)

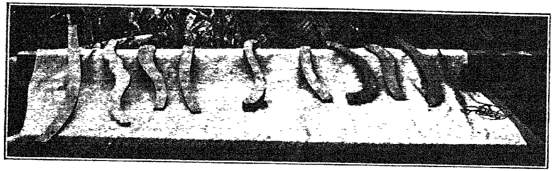

Fig. 1. Models used in making chairs.

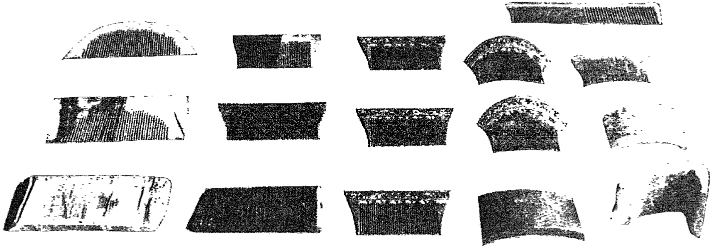

Fig. 3. Combs at different stages of manufacture.

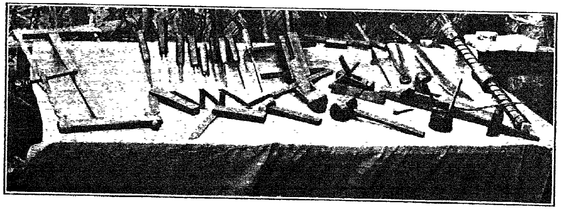

Fig. 2. Tools used in making furniture.

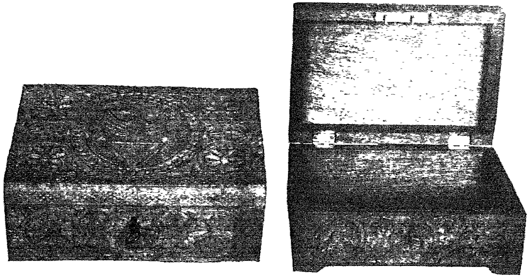

Fig. 4. Typical small boxes.

PLATE I.

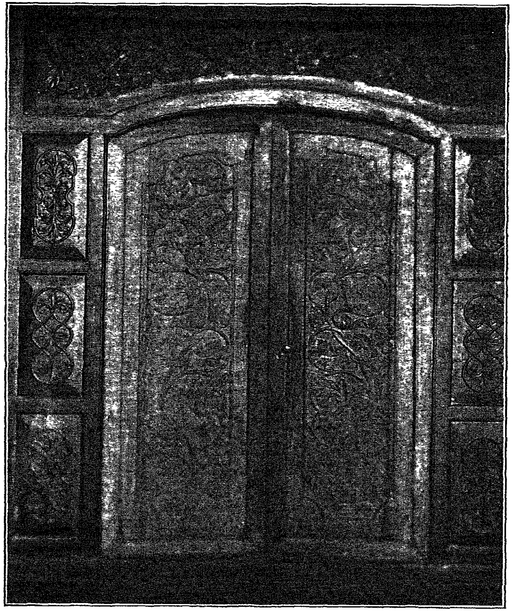

Fig. 1. Carved doors, San Vicente.

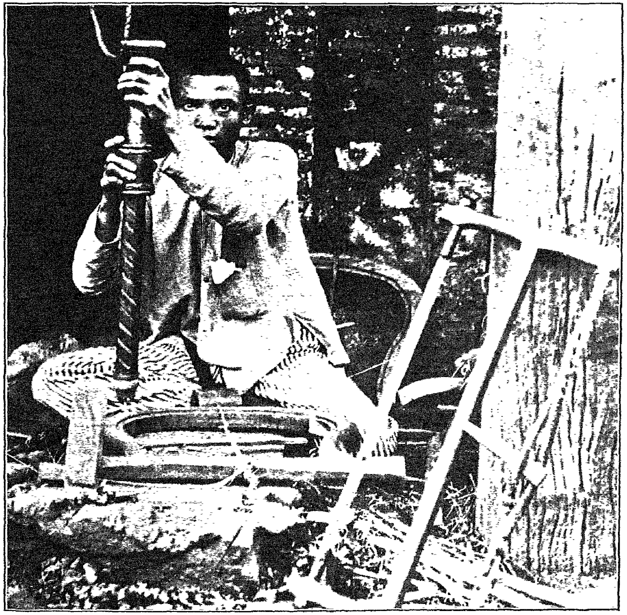

Fig. 2. Chair-maker at work.

PLATE II.

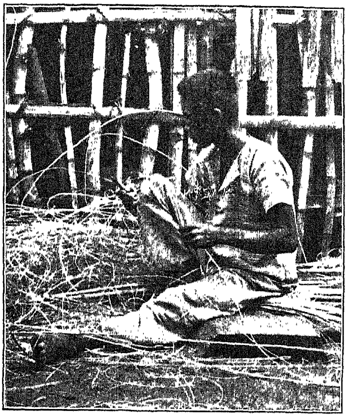

Fig. 1. Man preparing rattan.

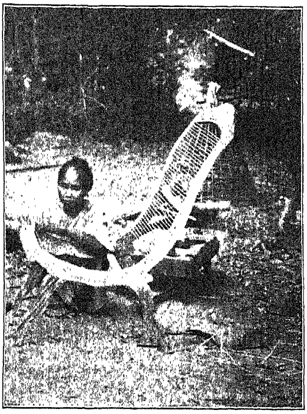

Fig. 2. Girl putting the rattan seat and back in a chair.

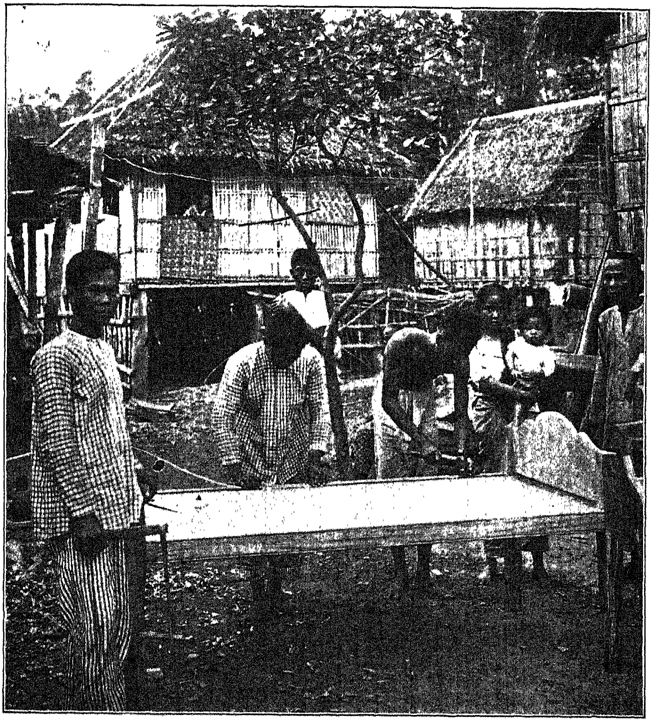

Fig. 3. Men making a bed.

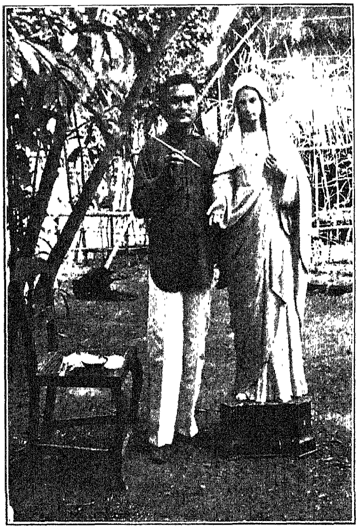

Fig. 1. Wood carver finishing a wooden statue.

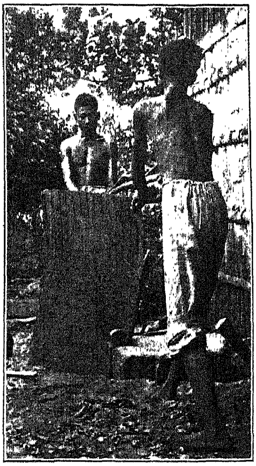

Fig. 2. Sawyers at work.

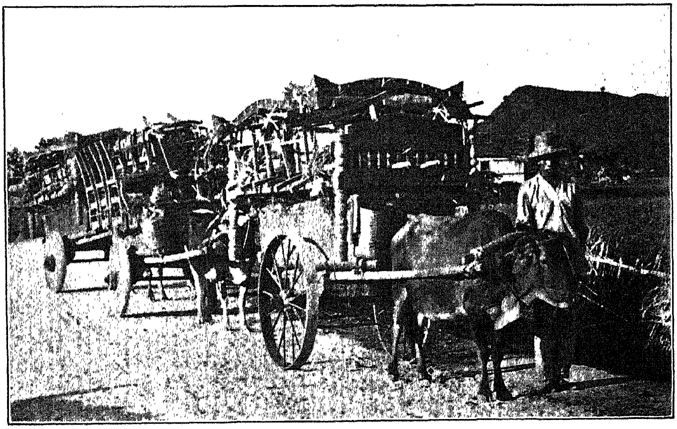

Fig. 3. Carts loaded with San Vicente furniture.

PLATE IV.

THE PHILIPPINE JOURNAL OF SCIENCE,
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Vol. VII, No. 4, 1912.

DESCRIPTION OF A NEW GECKO FROM BOTEL TOBAGO ISLAND.

By MASAMITSU OSHIMA.
(Of the Institute of Science, Government of Formosa.)

In June, 1912, I collected a pair of geckos at Kōtōsho (Botel Tobago Island, dependency of Formosa) that appear to represent an undescribed species. I take great pleasure in dedicating it to my collector, Yonetaro Kikuchi.

Gecko kikuchii sp. nov.

Habitat.—Kōtōsho, Formosa.

Type.—Catalogue No. 1; Institute of Science, Government of Formosa; Kōtōsho (Botel Tobago Island); June 14, 1911; M. Oshima, collector.

Description of type.—Rostral pentagonal, about twice as wide as high, bounded above by 2 large internasals and 1 small scale between the latter, the supralateral margin entering the nostrils; nostril between first supralabial, rostral, large internasal, and 2 larger shields above and behind; distance between nostril and eye considerably greater than the distance between eye and ear-opening; diameter of eye nearly equal to one-half the distance between eye and tip of snout; ear-opening large and oval, its longest diameter one-half the diameter of eye; 13 supralabials; mental trigonal, larger than the adjacent lower labials; 10 lower labials; behind mental a pair of median, somewhat elongated chin-shields, on either postero-lateral side of which another similar but smaller shield, 1 pentagonal shield between the latter; whole upper surface covered with granules, those on the snout considerably the largest; among the granules, from the ear-opening backward to the basal half of the tail, numerous small, rounded tubercles, their mutual distance averaging about one-half the diameter of ear-opening, not arranged in regular longitudinal series, though about 18 tubercles can be counted in a line across the back; upper surface of limbs covered with granules and tubercles like the back; lower surface of body and limbs covered with imbricate scales, except the throat and anterior portion of neck, which are covered with granules of the size of those on the back; first toe with 13 lamellæ, forth with 14 underneath; second, third, and fourth toes connected by a basal web; a series of 24 femoral pores on each side, of which the inner 10 are oval; the others, round; tail gradually tapering, slightly depressed, not annulate, upper surface covered with small scales and 4 to 6 rows of tubercles; underneath, scales larger, with a median series of wide plates, all of the same width; color (in alcohol) drab gray above, with 2 obscure, dusky, longitudinal bands on the back; pale ill-defined markings on both upper and lower labials; under side whitish.

Measurement.	Mm.
Total length	182
Snout to vent	80
Vent to tip of tail	102
Snout to ear-opening	22
Greatest width of head	18
Fore leg, from axilla,	25
Hind leg, from groin,	35

The adult female differs from the male, chiefly in the absence of the preanal pores and of the basal web on the toes; back with 9 pairs of ill-defined black spots.

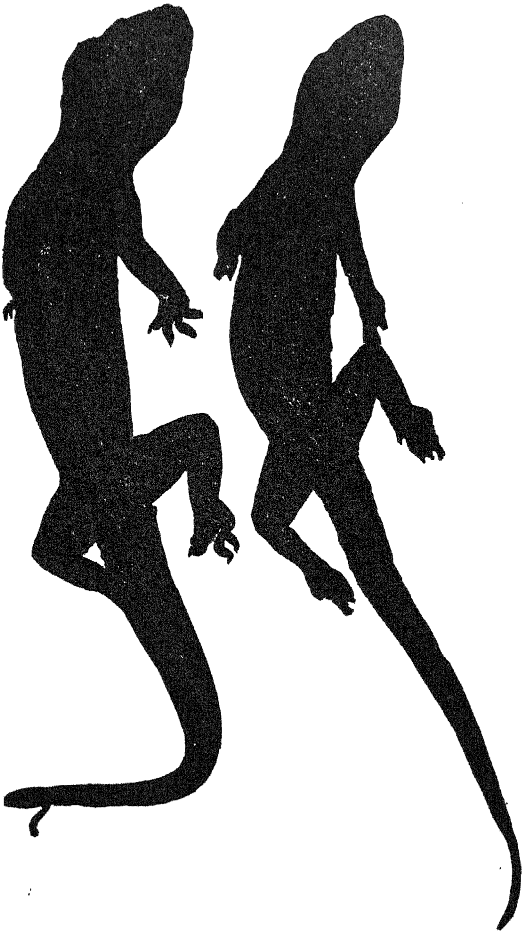
ILLUSTRATIONS.

PLATE I.

Gecko kikuchii sp. nov., dorsal view of (1) male and (2) female, natural size.

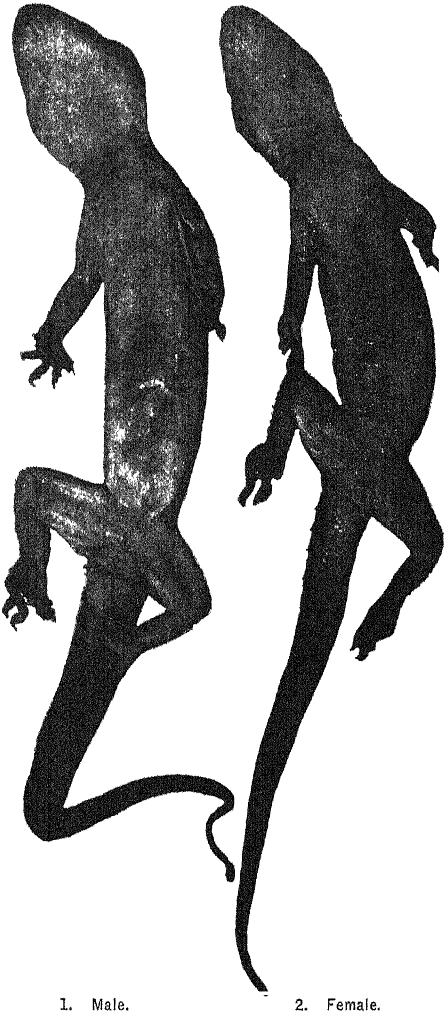
PLATE II.

Gecko kikuchii sp. nov., ventral view of (1) male and (2) female, natural size.



1. Male. 2. Female.

PLATE I. GECKO KIKUCHII sp. nov. Dorsal view (natural size).



1. Male. 2. Female.

PLATE II. GECKO KIKUCHII sp. nov. Ventral view (natural size).

THE PHILIPPINE JOURNAL OF SCIENCE,
D. General Biology, Ethnology and Anthropology.
Vol. VII, No. 4, 1912.

NEUE STAPHYLINIDEN DER PHILIPPINEN.

VON MAX BERNHAUER.
(Grünburg, Ober-Oesterreich.)

Herr W. Schultze, vom Bureau of Science in Manila, hatte die Güte mir eine Anzahl Staphyliniden einzusenden, welche auf den Philippinen von verschiedenen Sammlern gefangen worden sind.

Indem ich Herrn Schultze für die mir übertragene Bearbeitung des Materiales verbindlichen Dank ausspreche, lasse ich die Beschreibung der in demselben vorgefundenen neuen Arten folgen:

Priochirus (Plastus) philippinus sp. nov.

Dem *Priochirus cavifrons* Fauv. nahe verwandt, aber fast dreimal grösser, ausserdem in folgenden Punkten verschieden:

Der Kopf ist im Verhältnisse zum Halsschilde kleiner und schmäler, die Fühler länger, die vorletzten Fühlerglieder weniger quer: die seitlichen Stirnzapfen sind viel länger und schlanker; der kleine Zahn auf der Unterseite ist viel schärfer und grösser; ebenso treten die mittleren Stirnzähnchen stärker hervor; der Vorderrand der Stirn ist über den Clypeus stark vorgezogen, der Stirnrand ist daher viel schärfer vortretend. Das Halsschild ist etwas flacher und vor den Hinterecken viel spärlicher punktiert, der Hinterleib endlich ist weitläufiger und feiner punktiert.

Von *sexdentatus* Bernh. dem die neue Art habituell sehr ähnlich ist, lässt sich die letztere auf den ersten Blick durch das gefurchte erste Fühlerglied sofort trennen.

Länge: 16 mm.

LUZON, Benguet, Baguio. (*H. M. Curran,* Coll.) No. 9921 der Entomologischen Sammlung des Bureau of Science, Manila, P. I.

Priochirus (Plastus) currani sp. nov.

Dem *Priochirus sexdentatus* Bernh. noch näher verwandt als die vorige Art, mit ungefurchtem ersten Fühlergliede, jedoch durch nachfolgende Merkmale von ihm sicher verschieden.

Der seitliche Stirnzapfen ist viel kürzer, das freie Ende ist kaum halb so lang als der Stirneindruck, das untere Zähnchen ist kleiner, die mittleren Zähnchen sind durch eine viel breitere bogige Ausrandung getrennt, so dass der Raum zwischen denselben viel breiter ist, als die Entfernung von den Stirnzapfen, der Stirneindruck selbst ist in der Mittellinie ziemlich tief der Länge nach eingedrückt.

Die Fühler sind viel länger und schlanker, die vorletzten Glieder weniger stark quer.

Das Halsschild ist etwas flacher, am herabgebogenen Seitenrande spärlicher punktiert, die punktierte Zone ist von der Seitenrandleiste durch einen breiten glatten unpunktierten Zwischenraum getrennt, während bei *sexdentatus* diese punktierte Zone bis zur Randleiste geht.

Die Fühler sind viel länger und schlanker, die vorletzten und weitläufiger punktiert.

Länge: 10.5 mm.

LUZON, Benguet, Mt. Pulog. (*H. M. Curran*, Coll.) No. 10262 der Entomologischen Sammlung des Bureau of Science, Manila, P. I.

Priochirus (Plastus) schultzei sp. nov.

Mit *Priochirus luzonicus* Fauv. sehr nahe verwandt, aber bei einiger Aufmerksamkeit leicht durch folgende Unterschiede zu erkennen.

Der Stirneindruck ist flacher, die Mittelfurche auf demselben viel schärfer, die seitlichen Zähne viel stärker entwickelt als die mittleren und ragen mehr als doppelt so weit über den Stirnvorderrand als die mittleren, während bei *luzonicus* Fauv. die seitlichen Zähnchen die mittleren nur ganz wenig überragen. Die Fläche über den mittleren Zähnchen ist bei der neuen Art flach, während sie bei *luzonicus* beulenartig erhoben ist. Ein weiterer sehr markanter Unterschied liegt darin, dass der Seitenrand im ausgebuchteten Teile vor den Hinterecken scharf gerandet ist während dieser Teil bei *luzonicus* ungerandet ist.

Endlich sind die Fühler entschieden kürzer und die vorletzten Glieder stärker quer als bei *luzonicus*.

Länge: 7.5 mm.

MINDORO, Bongabon. (*W. Schultze,* Coll.) No. 8400 der Entomologischen Sammlung des Bureau of Science, Manila, P. I.

Priochirus (Plastus) manilensis sp. nov.

Ebenfalls mit *luzonicus* Fauv. nahe verwandt, von demselben aber leicht durch das hinten vollständig gerandete Halsschild, viel kürzere Fühler, den an der Basis der Segmente ziemlich dicht punktierten Hinterleib sowie die Kopfbewehrung verschieden; durch letztere ist die Art auch sofort von der vorherigen Art zu unterscheiden.

Der Stirneindruck ist ähnlich flach ausgebreitet wie bei *schultzei,* besitzt jedoch längs der Mittellinie keine Furche, die Zähnchen sind viel kleiner, die seitlichen ragen nur mässig weiter vor als die mittleren, diese sind sehr klein und stehen einander viel näher als den seitlichen.

Die Fühler sind kurz, die vorletzten Glieder ungefähr doppelt so breit als lang.

Länge: 7.5 mm.

LUZON, Manila. (*W. Schultze,* Coll.) No. 2510 der Entomologischen Sammlung des Bureau of Science, Manila, P. I.

Oxytelus megaceros var. **flavicollis** nov.

Die neue Form unterscheidet sich vom typischen *megaceros* durch kleinere Gestalt (3 mm.), etwas kürzere Fühler und andere Färbung und dürfte sich vielleicht beim Hervorkommen grösseren Materiales als eine eigene Art erweisen.

Während bei *megaceros* Stammform die Flügeldecken weissgelb und der lichteste Teil des Körpers sind, ist dies hier umgekehrt; die Flügeldecken sind dunkel gelbbraun, ähnlich wie der Hinterleib, das Halsschild ist hellgelb, der Kopf gelblich geschwärzt.

Bisher ist mir diese Form nur von den Philippinen bekannt geworden.

Bledius compressicollis sp. nov.

Eine durch das seitlich stark eingedrückte Halsschild und die Geschlechtsauszeichnung des ♂ sehr ausgezeichnete und leicht kenntliche Art.

♂ Rötlichgelb, der Kopf dunkler, das Halsschild mehr rötlich, die Beine, Taster und Fühlerwurzel hellgelb.

Der Kopf ist schmäler als das Halsschild, mit Ausnahme des matt und grob chagrinierten Stirneindruckes, glänzend glatt, unpunktiert; der Scheitel ist hinten in einen scharf spitzigen, grossen Höcker, die Stirn vor den Augen in je einen breiten, fast parallelen, hoch über die Stirnfläche emporragenden Fortsatz erhoben, welcher an der Spitze ausgerandet und innen in einen ziemlich schmalen Dorn ausgezogen ist. Die Fühler sind mässig lang, ihre vorletzten Glieder nur wenig breiter als lang.

Halsschild vorn fast breiter als die Flügeldecken, an den Schultern, so lang als breit, nach rückwärts stark verengt, an den Seiten vorn gerundet, dann geradlinig und im letzten Drittel wieder gerundet und daselbst plötzlich verengt, in der Mitte der Oberfläche stark erhoben, daselbst glatt, unpunktiert, und fein gefurcht, an den Seiten stark zusammengedrückt, kräftig und dicht punktiert, im Grunde deutlich chagrinirt, vorn tief schmal eingedrückt, der Eindruck unpunktiert und rückwärts gegen die punktierte Halsschildoberfläche wulstig abgesetzt. Der Vorderrand des Halsschildes ist in der Mitte in einen gegen die Spitze rasch verjüngten, schmalen, die Hälfte der Halsschildlänge erreichenden nach unten gebogenen Dorn ausgezogen.

Flügeldecken deutlich kürzer als das Halsschild, nach rückwärts etwas erweitert, kräftig und dicht punktiert.

Der Hinterleib zeigt an den Seiten und Hinterrändern der 4 ersten freiliegenden Tergite eine seichte runzelige mässig dichte Punktierung.

Länge: 4 mm. (bei ziemlich eingezogenem Hinterleibe).

Die Unterseite des Hinterleibes zeigt keine besondere Geschlechtsauszeichnung des ♂ und ist ziemlich gleichmässig dicht punktiert.

LUZON, Manila. (*C. S. Banks*, Coll.) No. 5777 der Entomologischen Sammlung des Bureau of Science, Manila, P. I.

Bledius philippinus sp. nov.

Den *Bledius brunnipennis* Fabr. nahe verwandt, jedoch viel kleiner, von hellerer Färbung und besonders durch die viel weitläufigere Punktierung und den stärkeren Glanz des Halsschildes und der Flügeldecken leicht zu unterscheiden.

Pechbraun mit hellerer Hinterleibsspitze, die Fühlerwurzel und die Beine rötlich gelb. Kopf matt chagriniert, beim ♂ mit zwei langen, spitzigen Stirnfortsätzen ähnlich wie bei *tricornis*.

Halsschild etwas breiter als lang, in der Mittellinie tief gefurcht, kräftig und dicht, gegen die Mitte zu weniger dicht punktiert, beim ♂ vorn in einen schmalen langen gleichbreiten Dorn verlängert, der fast so lang als das Halsschild ist.

Flügeldecken deutlich länger als das Halsschild, kräftig und dicht punktiert, Abdomen grob und ziemlich dicht punktiert und mit langen Haaren dicht bekleidet.

Länge: 6 mm.

LUZON, Manila. (*C. S. Banks*, Coll.) Nos. 2398, 2410, 8063 der Entomologischen Sammlung des Bureau of Science, Manila, P. I.

Stenus montalbanensis sp. nov.

Dem *Stenus arachnipes* Bernh. in Gestalt und Färbung sehr ähnlich, aber in folgenden Punkten verschieden:

Der Kopf ist etwas stärker punktiert, die Augen im Verhältnisse zu demselben grösser.

Das Halsschild ist doppelt so grob und viel weitläufiger punktiert. Die Flügeldecken viel kürzer, schmäler, gröber und weitläufiger punktiert, der Hinterleib endlich ist ebenfalls stärker und weitläufiger punktiert.

Die Flügeldecken sind deutlich etwas kürzer als das Halsschild; die Schultern stehen weniger vor als bei *arachnipes* Bernh.

Länge: 5 mm.

LUZON, Rizal, Montalban Gorge. (*C. S. Banks*, Coll.) No. 5456 der Entomologischen Sammlung des Bureau of Science, Manila, P. I.

Stenus philippinus sp. nov.

In die Gruppe des *acuminatus* Krtz. gehörig, von demselben, sowie von *planifrons* Fauv. durch weniger dichte Punktierung des Körpers und namentlich des Abdomens sofort zu unterscheiden.

Schwarz mit sehr undeutlichem Erzschimmer, die Fühler bis auf das schwarze erste Glied und die gebräunte Spitze, die Taster und die Beine rötlichgelb, die äusserste Spitze der Schenkel schwärzlich.

Kopf breit, so breit als die Flügeldecken, flach ausgehöhlt, mit schwacher Andeutung von 2 geglätteten Längsfurchen, kräftig und dicht punktiert, mit glänzenden Zwischenräumen der Punkte, Fühler ziemlich kurz, mit entwickelter Keule.

Halsschild viel schmäler als die Flügeldecken, länger als breit, in der Mitte am breitesten, hinter der Mitte etwas ausgebuchtet, dicht und kräftig runzelig punktiert, mit schmalen erhobenen glänzenden Zwischenräumen.

Flügeldecken an der Naht etwas kürzer als das Halsschild, fast quadratisch, kräftig und dicht runzelig punktiert, die schmalen Zwischenräume der Punkte glänzend.

Hinterleib ziemlich glänzend, kräftig und dicht, hinten feiner und weitläufiger punktiert.

Länge: 3.5 mm.

Beim ♂ ist das fünfte Sternit kaum ausgebuchtet, das sechste, weniger tief dreieckig ausgerandet.

Paederus philippinus sp. nov.

In der Körpergestalt und Farbe unserem europäischen *ruficollis* Fauv. sehr ähnlich, jedoch noch kleiner als *gemellus* Krtz.

Die Färbung ist etwas dunkler blau als bei *ruficollis*, der Hinterleib fast schwarz, die Punktierung der Flügeldecken ist stärker und viel weitläufiger, zugleich sind die letzteren, im Verhältniss zum Halsschilde, deutlich länger.

Am leichtesten ist die neue Art jedoch an der Gestalt des Kopfes von *ruficollis* Fauv. zu unterscheiden.

Der Kopf ist nämlich viel länger und schmäler und nach rückwärts geradliniger verengt, ausserdem ist derselbe auch stärker und dichter punktiert.

Länge: 6 mm.

LUZON, Rizal, Montalban Gorge. (*C. S. Banks*, Coll.) No. 5458 der Entomologischen Sammlung des Bureau of Science, Manila, P. I.

Medon philippinus sp. nov.

Von gleichbreiter Gestalt, bräunlich schwarz, matt, der breite Hinterrand sowie die Hinterecken der Flügeldecken bis zum letzten Fünftel der Flügeldeckenlänge hellgelb, die Fühler und Taster gelblichrot, die Hinterränder der letzten Hinterleibsringe sowie die Beine gelb, die Schenkel teilweise angedunkelt.

Kopf so breit als das Halsschild, so breit als bis zum Vorderrande lang, von den Augen nach rückwärts vollkommen parallel, vor denselben verjüngt, hinten gerade abgestutzt mit kurz verrundeten Hinterecken. Fühler ziemlich lang, die vorletzten Glieder länger als breit. Die Oberseite des Kopfes ist sehr fein und äusserst dicht punktiert.

Halsschild etwas schmäler als die Flügeldecken, fast so lang als breit, an den Seiten gerade, nach rückwärts kaum verengt, die Hinterecken verrundet, längs der Mittellinie mit einer schmalen glänzenden Kiellinie, sonst wo möglich noch feiner und dichter als der Kopf punktiert, vollkommen matt.

Flügeldecken um ein Stück länger als das Halsschild, zusammen länger als breit, lang rechteckig, ähnlich wie das Halsschild punktiert.

Abdomen äusserst fein und äusserst dicht chagrinartig punktiert und seidenschimmernd behaart.

Beim ♂ ist das sechste Sternit seicht, das fünfte kaum ausgerandet, besitzt jedoch auf dem grössten Teile des Hinterrandes eine Reihe dichtstehender, starrer, kurzer, schwarzer Börstchen, welche kammartig angeordnet sind.

Die neue Art gehört in die nächste Nähe von *Medon robustus* Bernh., ist aber durch die ausserordentlich dichte Punktierung des ganzen Körpers sofort von demselben zu unterscheiden.

Länge: 5 mm.

LUZON, Rizal, Montalban Gorge. (*C. S. Banks,* Coll.) No. 5644 der Entomologischen Sammlung des Bureau of Science, Manila, P. I.

Scopaeus montalbanensis sp. nov.

Unter den übrigen matten Arten des Subgenus *Scopaeus* sens. str. der Indo-malayischen Fauna durch die Färbung, überdies durch den langen Kopf ausgezeichnet.

Dunkelschwarz, der Hinterrand der Flügeldecken breit hellgelb gesäumt, die Fühler, Taster und Beine pechbraun, die Schienen und Tarsen gelblich.

Der ganze Körper ist äusserst dicht und fein punktiert und grau seidenschimmernd behaart, die Punkte selbst unter stärkster Lupenvergrösserung nicht sichtbar. Auf den Flügeldecken ist die Punktierung ein klein wenig feiner, als am Kopf und etwas rauh.

Der Kopf ist so breit als das Halsschild, länger als breit, fast parallelseitig, nach rückwärts kaum unmerklich verengt. Das Halsschild ist um ein Stück schmäler als die Flügeldecken, um die Hälfte länger als breit, im ersten Drittel am breitesten, längs der Mittellinie ausserordentlich schmal geglättet.

Die Flügeldecken sind ungefähr so lang als das Halsschild, parallelseitig, der Hinterleib nach rückwärts stark keulenartig erweitert und dann plötzlich wieder verjüngt.

Beim ♂ ist das sechste Sternit sehr tief spitzwinklig ausgeschnitten, das fünfte ist am Hinterrande tief doppelbuchtig, der Mittellappen halbkreisförmig vorgezogen.

Länge: 3.5 mm.

LUZON, Rizal, Montalban Gorge. (*C. S. Banks,* Coll.) No. 5650 der Entomologischen Sammlung des Bureau of Science, Manila, P. I.

Cryptobium banksi sp. nov.

Dem *Cryptobium abdominale* Motsch. nahe verwandt, aber von allen seinen Formen durch um die Hälfte grössere Gestalt und die kräftigere und zweimal weitläufigere Punktierung der Flügeldecken sofort zu unterscheiden.

Die Fühler sind zugleich etwas länger, der Kopf fast noch schmäler und gestreckter, kaum so breit als das Halsschild, dieses ist etwas gröber und weitläufiger punktiert.

Die Farbe ist schwarz, der Spitzenrand der Flügeldecken ist gelbrot, die Fühler und Taster rostrot, die Beine weissgelb, der Hinterrand der letzten Hinterleibsringe rötlich.

Länge: 8.5 mm.

LUZON, Rizal, Montalban Gorge. (*C. S. Banks*, Coll.) No. 5645 der Entomologischen Sammlung des Bureau of Science, Manila, P. I.

Cryptobium abdominale Motsch.

Kommt auf den Philippinen in einer ganz roten Form vor, von der nur die weissgelben Beine scharf abstechen und welche ich var. nov. *rubiginosum* benenne.

Thyreocephalus philippinus sp. nov.

Tiefschwarz, glänzend, die Flügeldecken dunkel erzfarbig, der Hinterleib mit schwächerem Erzglanze, die Hinterleibsspitze rötlich, die Fühler, Taster und Beine dunkel rostrot.

Kopf, breiter als das Halsschild, länger als breit, ziemlich flach, nach rückwärts etwas erweitert, mit länglichen, kräftigen Nabelpunkten dicht besetzt, längs der Mittellinie viel feiner und weitläufiger, vorn nur sehr fein und spärlich punktiert.

Halsschild vorn so breit als die Flügeldecken zwischen den Schultern, nach rückwärts ausgeschweift verengt, lackglänzend, auf der Scheibe unpunktiert, nur gegen die Vorderecken und an den Seiten mit einigen Punkten und dem grossen, von den Seiten ziemlich stark abgerücktem Porenpunkte.

Flügeldecken so lang als das Halsschild, ziemlich kräftig, tief und ziemlich dicht punktiert.

Hinterleib kräftig und dicht, rauh, längs der Mitte und dem achten Tergit viel feiner und weitläufig punktiert.

Länge: 10 mm.

LUZON, Rizal, Montalban Gorge. (*C. S. Banks*, Coll.) No. 5643 der Entomologischen Sammlung des Bureau of Science, Manila, P. I.

Amichrotus merritti sp. nov.

Vollkommen matt, Kopf und Hinterleib tiefschwarz, Halsschild und Flügeldecken sowie die ganze Brust rot, der Hinterrand der Flügeldecken, mit Ausnahme der Nahtpartie, je eine Apikalmakel, am Seitenrande der ersten 3 freiliegenden Tergite, zwei grosse Makeln, am Hinterrande des dritten freiliegenden Tergites, welche nach vorn bis zum basalen Drittel reichen, von einander durch einen mässig breiten Zwischenraum und von den seitlichen Randmakeln nur sehr schmal getrennt sind und die Basalhälfte des achten (sechsten freiliegenden) Tergites sowie die Beine weisslichgelb, die Aussenseite der Vorderschenkel und die Apikalpartie der übrigen Schenkel gebräunt.

Kopf breiter als das Halsschild, ungefähr um ein Viertel breiter als lang, mit sehr grossen Augen, deren Längsdurchmesser wohl mehr als viermal so lang als die Schläfen ist, auf der Oberseite vorn zwischen den Augen matt gerunzelt, hinter dieser Partie äusserst dicht und mässig stark nabelig gerunzelt-punktiert, längs der Mittellinie zwischen den Augen mit einem schmalen und mässig langem Spiegelfleck.

An den schlanken Fühlern ist das Endglied schwarz, die 3 vorhergehenden weissgelb, die Glieder 4 bis 7 tiefschwarz, die 3 Wurzelglieder schmutzig gelblichrot; die vorletzten Glieder sind länger als breit. Die Mandibeln und Taster sind sehr schlank und lang.

Halsschild viel schmäler als die Flügeldecken, länger als breit, herzförmig, nach rückwärts stark verengt und ausgebuchtet, überall äusserst dicht runzelig punktiert, vollkommen matt, dicht goldgelb behaart.

Flügeldecken etwas länger als das Halsschild, ähnlich wie dieses skulptiert. Hinterleib äusserst dicht schwarz tomentiert, die Grundskulptur nicht sichtbar, das achte Tergit fein und weitläufig punktiert.

Die Vorderschenkel des einzigen vorläufig vorhandenen Stückes sind auf der Unterseite dicht bürstenartig behaart; ob dies eine Geschlechtsauszeichnung des ♂ ist, wage ich vorläufig nicht zu behaupten. Erstes Glied der Hintertarsen so lang als die 3 folgenden Glieder.

Länge: 15 mm. (Bei ausgezogenem Hinterleibe.)

LUZON, Laguna, Mt. Banajao. (*M. L. Merritt*, Coll.) Type, No. 8075 des Bureau of Science, in meiner Sammlung.

Philonthus convexus sp. nov.

Dem *Philonthus inconstans* Sharp aus Japan ausserordentlich nahe verwandt und von demselben nur durch grössere Gestalt, nach hinten deutlicher verengtem Kopf, kürzeren, nach vorn deutlich verschmälertem Halsschild und insbesondere durch viel weitläufiger und stärker punktierte Flügeldecken verschieden.

Länge: 6 mm.

LUZON, Rizal, Montalban Gorge. (*C. S. Banks*, Coll.) Type, No. 5647 des Bureau of Science, in meiner Sammlung.

Aleochara philippina sp. nov.

Eine durch die Färbung der Fühler und des tiefschwarzen, stark glänzenden Körpers ausgezeichnete Art der *curtula* Gruppe.

Tiefschwarz, stark glänzend, die Beine bräunlich, die Fühler rötlichgelb, die 4 ersten Glieder scharf abgegrenzt schwarz.

Kopf sehr klein, viel schmäler als das halbe Halsschild, grob und mässig dicht punktiert. Halsschild hinten so breit als die Flügeldecken, um ein Viertel breiter als lang, nach vorn stark verengt, an den Seiten gerundet, vor den vollkommen verrundeten Hinterecken stark schräg eingedrückt, überall mässig stark und wenig dicht punktiert.

Flügeldecken etwas kürzer als das Halsschild, zusammen stark quer, innerhalb der Hinterwinkel nicht ausgebuchtet, ebenso stark, aber doppelt dichter punktiert als das Halsschild. Hinterleib weniger stark und viel weitläufiger punktiert als die Flügeldecken.

Länge: 5 mm.

LUZON, Laguna, Mt. Banajao. (*C. S. Banks*, Coll.) Type, No. 7202 des Bureau of Science, in meiner Sammlung.

THE PHILIPPINE JOURNAL OF SCIENCE,
D. General Biology, Ethnology and Anthropology.
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NACHTRAEGE UND BERICHTIGUNGEN ZU: „DIE RUTELIDEN DER PHILIPPINISCHEN INSELN.“[1]

Von FR. OHAUS.

(*Steglitz, Berlin, Germany.*)

Anomala (Heteroplia) sanchezi sp. nov.

Anomala leotaudii Blanchard similis, at multo major. Oblonga, cylindrica, nitida. Clipeus transversus lateribus, parallelis, angulis anticis paulo rotundatis, rufus, margine anguste reflexo fusco, tota superficie rugulose punctatus subopacus. Sutura frontalis recta, frons triangulariter leviter impressa sicut clipeus rugulose punctata subopaca, vertex disperse punctulata nitida. Thorax fuscus certo visu viridiolivaceus margine laterali sat late flavo, undique dense, hic illic confluenter ac rugulose punctatus, medio angulatim fere lateribus dilatatus, lateribus antice valde convergentibus, angulis anticis paulo productis, posticis rectis vix rotundatis. Scutellum rufum fuscomarginatum dense confluenter punctatum. Elytra postice paulo ampliata fusca costis et rugis elvatis flavis, regulariter striatopunctata et praeterea tota superficie punctis parvis dense obtecta, humeris et callis apicalibus prominentibus rugulosis. Pygidium flavum fusco variegatum fortiter rugulose punctatum lateribus et apice sparsim pilis longis flavis obsitum. Subtus cum pedibus flava, tibiis posticis, tarsis, genibus et dentibus tibiarum fuscis; abdominis segmenta fortiter rugulose punctata, pectus dense et longe flavopilosum; tibiae anticae indistincte tridentatae; antennarum clava in ♂ elongata.

♂ ♀ Long. 15–17, lat. 9–9.5 mm.

LUZON, Benguet, Baguio. (*F. Sanchez, S. J.* legit.)

Type ♂ und ♀, No. 13287 in der Entomologischen Sammlung des Bureau of Science, Manila, P. I.

Die undeutlich 3-zähnigen Vorderschienen bringen die Art in

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[1] *Phil. Journ. Sci., Sec. D* (1910), 5, 233.

Beziehung zur Untergattung *Heteroplia,* wofür auch die Verlängerung der Fühlerkeule beim ♂ spricht, während die Sculptur der Flügeldecken für *Heteroplia* ungewohnt ist. Die Rippenbildung geht hier sehr weit und führt stellenweise zur vollständigen Auflösung in Punktreihen und Höckerchen. Die Nahtrippe ist regelmässig, nur gegen die Spitze hin etwas verschmälert. Im Interstitium subsuturale stehen 2 secundäre Rippen und zwischen diesen 2 tertiäre, oder der Raum zwischen den beiden secundären Rippen ist mehr oder weniger mit unregelmässigen Punkten, die im Grunde schwarzbraun sind, und gelblichen Höckerchen angefüllt; die 2te primäre Rippe ist von der Mitte ab durch eine etwas unregelmässige Punktreihe geteilt; das 2te Interstitium enthält 2 secundäre und zwischen diesen eine tertiäre Rippe; die 3te primäre Rippe ist zumeist einfach, wie die 3 folgenden an der Seite, in den äusseren Interstitien stehen 2 secundäre Rippen. Die ganze Oberfläche ist ziemlich dicht mit feinen Pünktchen übersät, die auf den Schultern und Spitzenbuckeln gröber werden und dadurch die Sculptur an diesen Stellen undeutlich machen.

Anomala exarata Burm.

Eine Untersuchung der Type im Hallenser Museum zeigte mir, dass ich diese Art nach der Beschreibung allein nicht richtig bestimmt hatte. Sie ist höher gewölbt und schmäler als die *sulcatula* Eschsch; ihre Grundfarbe braun mit hellgrünem Erzglanz, alle Rippen hoch gewölbt, in den 3 Interstitien auf der Scheibe der Deckflügel je 2 regelmässige secundäre convexe Rippen, Kopf, Vorderrücken und Schildchen sind ziemlich weitläufig und kräftig punktirt.

Ich habe die Art bisher nur von Celebes, Macassar, und von Klein Key (*H. Kühn* S.) erhalten und möchte fast bezweifeln, dass sie auf den Philippinen vorkommt. Was ich bisher für *A. exarata* Burm. hielt und bestimmte, ist eine der vielen Varietäten der *A. sulcatula* Eschsch., die offenbar im Stadium einer starken Variabilität sich befindet, die sich eigentümlicher Weise fast ganz auf die Sculptur der Deckflügel beschränkt und in einer intensiven Neubildung von Punktreihen und secundären Rippen äussert.[2]

Anomala (Euchlora) dasypyga Burm.

Die Type dieser Art ist ein ♂, nicht ein ♀, wie Burmeister angiebt, und misst 18 millimeter, nicht 14–16, Kopf, Halsschild und Schildchen sind grasgrün nur die Deckflügel olivengrün (braungrün). Die mir vorliegenden Stücke sind alle kleiner als die Type, 12–16 mill., stimmen aber in allen wesentlichen Merkmalen mit dieser überein, so dass ich aus dem Unterschied in der Grösse keinen Grund herleite, sie als spezifisch verschieden von dieser zu betrachten, zumal auch andere philippinische *Euchlora*-Arten beträchtlich in der Grösse variiren. Besonders charackteristisch für die Art ist ausser der grauweissen ziemlich dichten Behaarung des Pygidiums und der Seiten der Sternite der auffallend breite häutige Randsaum an den Deckflügeln, der zumeist ½ mill. breit und auf der Aussenseite dicht gestreift ist; er besteht aus 2 Lamellen, deren äussere (obere) doppelt so lang ist als die innere (untere), zuweilen abreisst und auf die Deckflügel zurück geschlagen wird; nahe dem Seitenrand der Deckflügel ist dieser häutige Randsaum braun, am Aussenrand gelb, durchscheinend.

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[2] *Ent. Zeitg.* Stett. (1897), 386.

Anomala (Euchlora) cladera sp. nov.

E. xanthoptera Blanch. (Ind. orient), et *praematura* Ohs. (Ins. Philipp.) proxime affines. Ovata, sat convexa, nitida, capite, thorace scutelloque viridiolivaceis, thoracis lateribus, elytris, pygidio, femoribus omnibus et coxis anticis flavotestaceis, corpore subtus cum tibiis et tarsis fuscocupreis.

♀ Long. 18–19, lat. 10 mm.

MINDANAO, Agusan River. (*W. Schultze* legit.)

Type ♀, No. 13687 in meiner Sammlung, Cotype ♂ in der Entomologischen Sammlung des Bureau of Science, Manila, P. I.

Vom richtigen Euchloren-Typus, oval, ziemlich stark gewölbt, gedrungen gebaut, lebhaft glänzend. Clipeus breiter als lang, die Seiten parallel, die Vorderecken leicht gerundet, der Rand kaum aufgebogen, die Fläche rotbraun, matt, dicht und fein runzelig punktirt. Stirnnaht sehr fein, leicht nach hinten geschwungen, Stirn dicht punktirt, matt, Scheitel zerstreuter punktirt, glänzend. Thorax von der gewöhnlichen Form, ohne Seitengrübchen aber mit feiner glatter Mittellinie, überall dicht und ziemlich kräftig punktirt, ringsum mit scharfer Randfurche, die nur von dem Schildchen unterbrochen ist. Scutellum zerstreut punktirt. Auf den Flügeldecken sind die primären Punktreihen regelmässig und hie und da furchenartig leicht vertieft, die Punkte wie auf dem Thorax ziemlich gross; ausserdem ist die ganze Oberfläche dicht mit ganz feinen Pünktchen übersät; der scharf abgesetzte Seitenrand reicht von der Schulter bis zum Hinterrand, wo hinter dem Spitzenbuckel die Sculptur grob höckerig wird; der häutige Randsaum ist breit. Das gelbe

Propygidium ist dicht punktirt, in jedem ein gelbes sehr kurzes Härchen; ausserdem nahe dem Hinterrand eine Querreihe langer gelber Borstenhaare. Das Pygidium ist fein erzgrün gesäumt, dicht mit unregelmässigen Augenpunkten bedeckt, ringsum mit einzelnen langen gelben Borstenhaaren. Bauchringe glänzend polirt mit verloschenen Augenpunkten und kurzen gelben Borsten. Brust zumal an den Seiten mit zusammenfliessenden groben Augenpunkten und feinen Runzeln, ziemlich spärlich graugelb behaart. Mittel- und Hinterschenkel am Vorderrand fein gerandet, Vorderschenkel mit einer scharfen Querfurche beim Hinterrand, aus der lange Borsten entspringen; Schienen und Tarsen ohne Besonderheiten; Fühler rötlich gelb.

Die eigentümlich olivengrüne (nicht grasgrüne) Färbung des Vorderkörpers mit glasig, zuweilen rötlich opalescirendem Glanz, das gelbe Pygidium und die glänzende kupfrige Unterseite, von der sich die hellgelben Schenkel scharf abheben, zeichnen diese Art von ihren Verwandten aus.

Anomala (Euchlora) maculifemorata sp. nov.

A. chloropygae affinis. Ovata, sat convexa, nitida, supra, saturate graminea, subtus viridiaenea, supra thoracis lateribus et maculis duabus ad pygidii latera, subtus maculis parvis ad segmentorum et coxarum latera, maculis ovalibus femorum et processuum coxarum posteriorum rufis.

♂ Long 16, lat. 9.5 mm.

LUZON. (*C. Semper* Coll.)

Aus der Verwandtschaft der *E. chloropyga* Burm., aber grösser, oben satt grasgrün, glänzend, Unterseite, Afterdecke, und Beine erzgrün, oben die Seiten des Thorax und 2 ovale Makeln auf dem Pygidium die sich an dessen Spitze beinahe berühren, aber nicht bis zu den Vorderecken reichen, unten scharf begrenzte Fleckchen an den Seiten der Sternite und Hinterhüften, ferner grössere ovale Makeln auf den Schenkeln nahe den Knieen sowie auf den mittleren Vorsprüngen der Hinterhüften rotgelb. Clipeus ziemlich lang, seine Seiten leicht convergirend, die Ecken schwach gerundet, der Rand ringsum fein aufgebogen und schwarz, die Fläche wie die Stirn dicht runzelig punktirt, nicht matt, die Stirnnaht fein erhaben, der Scheitel wie der Thorax und das Scutellum sehr dicht aber fein punktirt, der Thorax ziemlich lang mit rechtwinkligen Hinterecken und spitzen Vorderecken. Die Flügeldecken sind wie der Vorderkörper dicht und ziemlich fein punktirt; ausserdem sind auf der Scheibe die aus grösseren Punkten bestehenden primären Punktreihen vorhanden. Afterdecke dicht und fein runzelig, matt, dunkelgrün mit scharf abgesetzten roten ovalen Flecken am Seitenrand, ganz zerstreut und spärlich grau behaart. Bauchringe dicht punktirt, an den Seiten gerunzelt, mit der gewöhnlichen Querreihe von Borstenpunkten und ausserdem schwachen Haarbüscheln an den Seiten; Brust wie die Bauchseiten sculptirt und ziemlich spärlich grau behaart. Beine ziemlich schlank, Fühlerkeule rotgelb mit dunklerer Geissel.

Anomala (Euchlora) seticrus sp. nov.

A. bicolor Fabr. et *denticrus* Ohs. proxime affines. Ovata, sat convexa, nitida, supra laete prasina, thoracis lateribus sat late, pygidii parte apicali majore laete flavis, subtus cum femoribus laete flava, leviter aenescens, tarsis et tibiarum apicibus et marginibus exterioribus viridiaeneis. Tibiae posticae saturate intus marginatae et setis nigris sat fortibus instructae.

♂ ♀ Long. 17–18, lat. 10 mm.

PALAWAN, Iwahig. (*C. H. Lamb* Coll.)

Type ♂, No. 13223 in meiner Sammlung, Type und Cotype ♀ ♀, No. 13223 in der Entomologischen Sammlung des Bureau of Science, Manila, P. I.

Zur Gruppe der *Euchlora bicolor* Fabr. gehörig und in dieser der *denticrus* Ohs. von Borneo nahe verwandt. Hell grasgrün, lebhaft glänzend, die Seiten des Thorax ziemlich breit hellgelb, nicht goldig. Die Ecken des Clipeus etwas stärker gerundet als gewöhnlich, der Vorderrand ein wenig höher aufgebogen als die Seiten, auch die Augen grösser als gewöhnlich. Halsschild ziemlich kurz, die Seiten in der Mitte verbreitert und nach vorn und hinten gleichmässig gerundet, die Vorderecken wenig vorgezogen; an Stelle der Seitengrübchen ein schwacher Höcker. Kopfschild und die vordere Hälfte der Stirn dicht und fein runzelig punktirt, ihre hintere Hälfte und der Scheitel, das Halsschild und Schildchen weitläufiger mit scharf eingestochenen feinen Punkten bedeckt, die Seiten des letzteren ziemlich breit punktfrei. Auf den Flügeldecken ist die ganze Oberfläche mit mikroskopisch feinen Pünktchen dicht bedeckt und ausserdem sind die aus grösseren Punkten bestehenden primären Punktreihen regelmässig ausgebildet, auf der Scheibe teilweise in seichten Furchen stehend; die Epipleuren sind ziemlich dick, glatt, und reichen bis zum Hinterrand. Das Propygidium ist hinten grün, vorn braun, dicht mit Augenpunkten bedeckt, deren jeder ein mikroskopisch kleines goldgelbes Härchen trägt (bei der *denticrus* sind diese Haare länger und silbergrau). Das Pygidium ist äusserst dicht mit zusammenfliessenden Augenpunkten und kleinen Höckerchen bedeckt, matt seidenartig glänzend, ganz spärlich mit gelben Haaren bekleidet, die an der Basis und an den Seiten kurz, an der Spitze länger sind; an der Basis trägt es eine dreieckige kurze grasgrüne Makel, die nicht ganz bis zu den Vorderecken reicht und deren Spitze zugerundet ist; die grössere apicale Hälfte ist hellgelb. Die Unterseite und Schenkel sind hellgelb mit schwachen grünem Erzschiller, ebenso die Schienen, die nur an der Aussenseite und an den Kielen erzgrün sind. Bauchringe und Brust in der Mitte ganz spärlich mit verloschenen Augenpunkten, an den Seiten dicht runzelig punktirt und hier mässig dicht grauweiss, respectiv gelb behaart. Hinterschenkel und Hinterschienen verbreitert, die lezteren an der Innenseite mit scharf abgesetzter erzgrüner Kante die bei der basalen Stachelreihe ein Zähnchen und weiterhin eine Anzahl starker schwarzbrauner Stachelhaare trägt. Die Form des Forceps zeigt Fig. 1.

Anomala (Euchlora) nitidissima Blanchard.

Ehe ich an die Bearbeitung der Ruteliden der Philippinischen Inseln ging, bat ich Herrn P. Lesne, den Coleopterologen des Pariser Museums, mir typische Exemplare der von Blanchard aus den Philippinen beschriebenen Arten zur Ansicht zu schicken. Herr Lesne entsprach dieser Bitte in liebenswürdigster Weise; da aber, nach dem Reglement des Museums, Unica nicht verschickt werden dürfen, so schickte er mir von der *E. nitidissima,* deren Type ein Unicum ist, ein Exemplar, das neben der Type steckte und vielleicht von Blanchard selber später zu dieser Art gesteckt worden war. Auf eine weitere Nachfrage von meiner Seite äusserte Herr Lesne dann später selber Bedenken über die Zusammengehörigkeit der beiden Stücke zu einer Art und ich habe darum bei meinem Besuch im Pariser Museum im Juli 1911 Gelegenheit genommen, die Blanchard'sche Type genau zu untersuchen. Dabei konnte ich feststellen, dass das, was ich für *E. nitidissima* Blanch. gehalten und im Verzeichnis der Ruteliden der Philippinischen Inseln[3] aufführte, einer ganz anderen Art angehört, über die ich mich weiter unten äussern werde. Die Type der *E. nitidissima* Blanch. ist ein ♀, 16 mm. lang, 10 breit, auffällig flach gewölbt und breit, dunkel grasgrün, wie dick lackirt oder gerfirnisst erscheinend, zumal auf dem Pygidium, während die Unterseite dunkel erzgrün, in gewisser Beleuchtung kupfrig schillert. Das Kopfschild ist leicht trapezförmig, der Rand mässig hoch aufgebogen, die Oberfläche dunkelgrün mit kupfrigem Rand, der Randsaum schwarz, dicht und fein runzelig punktirt; ebenso ist die Stirn punktirt, auch neben den Augen stehen grobe Punkte, während der Scheitel fein und zerstreut punktirt ist. Der Thorax ist flach gewölbt, hinter der Mitte etwas erweitert, nach vorn stark verengt, die Vorderecken etwas vorgezogen, die Hinterecken stumpf und leicht gerundet, die ganze Oberfläche zerstreut und fein punktirt. Die Flügeldecken sind ganz fein und verloschen punktirt, ohne gröbere Punktreihen, nur neben den Epipleuren, die zumal neben den Schultern breit abgesetzt sind und bis zum Hinterrand reichen, ist die Sculpture dichter und kräftiger. Die Afterdecke ist hellgrün, die Sculptur ziemlich spärlich und fein, nur bei ganz bestimmter Beleuchtung, die Seiten etwas gelblich durchscheinend, die Oberfläche mit langen graugelben Haaren ziemlich reichlich besetzt. Seiten von Bauch und Brust ziemlich lang und dicht graugelb behaart, Schienen und Füsse satt erzgrün.

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[3] *Phil. Journ. Sci., Sec. D* (1910), 5, 259, No. 34.

Nach dem Zustand der leicht gerunzelten Flügeldecken und des Abdomens ist die Type offenbar ein frish entwickeltes, nicht ganz ausgefärbtes Stück. Ich besitze ein von J. Whitehead im März–April 1896, auf der Insel Negros gesammeltes ♀, das nach der teilweise abgeriebenen Behaarung zu schliessen schon längere Zeit im Freien gelebt hat und ganz ausgefärbt ist; bei diesem sind die Flügeldecken und die Afterdecke ebenso satt grasgrün wie der Vorderkörper, der Bauch und die Schenkel ebenso satt erzgrün wie die Schienen und Füsse. Sonst jedoch stimmt dieses Stück in allen wesentlichen Merkmalen mit der Type überein.

Die Art, die ich bisher für *E. nitidissima* Blanch. gehalten, ist neu und bedarf nun einer Beschreibung. Ich nenne sie nach den dachziegelartig angeordneten Höckerchen auf dem Pygidium.

Anomala (Euchlora) ceramopyga sp. nov.

Supra laete graminea, raro saturate graminea, nitidissima, thoracis lateribus plus minus anguste flavidis, subtus flavido-viridi-aenea cupreo splendore suffusa, tibiis tarsisque viridi-aeneis, pygidium aut flavidum viridiaenescens immaculatum, aut maculis parvis basalibus aut macula majore triangulari basali fuscoaeneo, aut totum fuscoaeneum lateribus pone apicem vix flavido pellucentibus; tota superficie subtiliter sat dense punctulata, pygidium lineis transversis tuberculorum teguliformium obtectum sparsissime hirsutum.

♂ ♀ Long. 18–21, lat. 10–13 mm.

LUZON, Manila (*Schadenberg, S.*); N. LUZON and S. LUZON, Albay (*J. Whitehead*); LUZON, Abra, Bangued (397, *C. S. Banks*); Occidental Negros, Bago (6019, *R. M. Araneta*).

Typen ♂ und ♀ in meiner Sammlung.

Oben hell grasgrün, selten dunkler grasgrün, lebhaft glänzend wie gefirnisst, die Seiten des Halsschildes rotgelb durchscheinend, die Unterseite gelb mit lebhaftem grünem und kupfrigem Erzschimmer, die Schienen und Füsse rein erzgrün, die Afterdecke entweder rein gelblich mit grünem Erzschimmer, oder mit 3 kleinen dunklen Flecken an der Basis oder mit einer grösseren dreieckigen dunkelgrünen Makel, deren Spitze nach dem After gerichtet ist, oder schliesslich ist die ganze Afterdecke dunkel erzgrün und nur die Seiten bei der Spitze scheinen bei bestimmter Beleuchtung gelblich durch. Das Kopfschild ist fein goldig gerandet, der niedrig aufgebogene Rand schwarz. Die ganze Oberseite ist fein und dicht punktirt, auf den Flügeldecken sind nur neben der Naht und auf der Scheibe Reihen grösserer Punkte (die primären Punktreihen) erkennbar, die Nahtrippe zumeist punktfrei, die Epipleuren scharf abgesetzt, in der Schulter. Spitzenbuckellinie zumeist eine Reihe kurzer Querfältchen. Die Afterdecke ist mit Querreihen feiner Höckerchen bedeckt, die dachziegelartig angeordnet sind; nur am Seitenrand und nahe der Spitze stehen vereinzelte lange gelbe Borsten, die Mitte zeigt gewöhnlich eine feine Längsfurche. Die Bauchringe sind, abgesehen von der Querreihe borstentragender Punkte, in der Mitte ganz spärlich, an den Seiten etwas dichter mit unvollständigen Augenpunkten, die Hinterhüften und Brust dagegen dicht mit solchen bedeckt, die letztere dicht aber ziemlich kurz graugelb behaart. Die Form des Forceps zeigt Fig. 2; die Parameren sind ziemlich lang, schnabelförmig gekrümmt, der Fortsatz der Ventralplatte des Mittelstückes ist lang und breit, bis zur Spitze der Parameren reichend, am Vorderrand ausgebuchtet, leicht löffelartig vertieft, mit einem zahnartigen Vorsprung auf der Unterseite nahe der Basis der Parameren.

Anomala (Euchlora) prasina Burm.

Am Schluss seiner Beschreibung dieser Art sagt Burmeister,[4] er zweifle kaum, dass diese seine Art identisch sei mit der *E. sieboldii* Hope, und nachdem ich die Type der *E. prasina* im Hallenser Museum untersucht habe, kann ich diese Vermutung Burmeister's nur bestätigen. Das eine der beiden Stücke im Hallenser Museum ist ziemlich klein, 18.5 mm. lang und nur 11 mm. breit, also relativ schlank, das Pygidium auffallend dicht und ziemlich grob sculptirt, lebhaft erzgrün, die Seiten kaum gelbrot durchscheinend. Aber in allen wesentlichen Merkmalen, vor Allem in der sehr auffälligen Form des Forceps, stimmt sie mit der *sieboldii* Hope überein. Ob die Art wirklich auf den philippinischen Inseln vorkommt, möchte ich bezweifeln; ich habe sie mit dieser Fundortsangabe bisher nur in 2 Exemplaren erhalten, das eine aus einer alten französischen Sammlung mit der Etikette "*Euchlora* n. sp. MANILA," das andere mit der Etikette "IS. PHILIPP." aus der Sammlung des verstorbenen Dr. Richter-Pankow, die viele Stücke mit falschen Fundortsangaben enthielt. Häufig ist die Art auf Süd Celebes, Macassar; Bua-Kraeng 3000 f., Feb., 1896, Samanga, Nov., 1895, Lompa-Battau 3000 f., März, 1896 (*H. Fruhstorfer S.*); Bantimurang (*C. Ribbe S.*); Bonthain 5–7000 f., Okt., 1895 (*A. Everett S.*), sowie auf Gross-Banda (*Staudinger*). Die mir vorliegenden Stücke von Bantimurang sind relativ klein, mit fast einfarbig gelbgrünem Pygidium, wodurch sie der *E. ceramopyga* m. sehr ähnlich werden. Allein die Sculptur der Flügeldecken, die noch gröbere Sculptur des Pygidiums und vor Allem die Form des Forceps (Fig. 3) unterscheiden sie sicher von dieser Art.

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[4] Handb. d. Entom. (1844), 4, Pt. I, 277.

Anomala (Euchlora) smaragdina Eschsch.

Im Kgl. Zoolog. Museum in Berlin befinden sich Stücke dieser Art, die das Museum von Eschscholtz selber erhielt und die darum als typisch betrachtet werden dürfen. Ihre Oberseite ist hell grasgrün, äusserst glänzend, wie lackirt, der Clipeus und das Scutellum an der Spitze fein goldig gerandet, die Seiten des Thorax breiter goldrot durchscheinend. Das Pygidium ist hell erzgrün, an den Seiten eine längliche rotgelbe Makel, die erzgrüne Partie, zumal an der Basis und Mitte, äusserst glänzend polirt, mit ganz wenigen verloschenen Punkten, die Seitenpartieen und Spitze dicht nadelrissig und fein höckerig. Die Unterseite ist hell erzgrün respectiv messingfarben mit kupfrigen Reflexen, die Schienen und Tarsen satt erzgrün. Die Form des Forceps zeigt Fig. 4.

Anomala (Euchlora) trigonopyga sp. nov.

Statura *E. smaragdinae,* plerumque major, laete prasina nitidissima, clipeo et scutello anguste auro-marginatis, thoracis latera late flavo et rufo-aureo marginata, pygidium rufum macula triangulari basali fuscoviridi-aenea ornatum; subtus flava, viridiaeneo et cupreo splendore suffusa, nitidissima, tibiae et tarsi saturatius viridi et cupreo-aenea; pectus densius et longius flavopilosum.

Long. 23–26, lat. 13, 5–15 mm., LUZON, Zambales (*Semper*); S. LUZON, Albay und MINDORO, Nov. 1895–Jan. 1896 (*J. Whitehead*).

Die grösste der philippinischen Euchloren, ausgezeichnet durch ihre prachtvolle und eigentümliche Färbung. Gewöhnlich hell grasgrün, selten etwas dunkler grün, äusserst glänzend polirt, zuweilen leicht rötlich opalescirend. Der Clipeus ist fein goldig gesäumt, das Scutellum hell erzgrün gerandet, zumeist nur die Spitze goldig. Die Seiten des Thorax scheinen breit (beim Seitengrübchen etwa 1.5 mm. breit) gelb durch, der Seitenrand ist goldrot gefärbt. Das Pygidium ist gelbrot, nur eine dreieckige Makel, die sich mit ihrer Basis an den Vorderrand des Pygidiums anlehnt, ist satt erzgrün, glänzend polirt. Die Unterseite ist gelb mit lebhaftem erzgrünem und kupfrigem Schiller, die Schienen und Tarsen sind satt erzgrün und kupferrot. Die ganze Oberseite ist dichter und kräftiger punktirt als die zunächst verwandte *smaragdina;* auf den Deckflügeln sind die primären Punktreihen deutlich ausgeprägt und beim Hinterrand leicht furchenartig vertieft, die Partie beim Spitzenbuckel dicht runzelig, matt, die Epipleuren sind breit abgesetzt, glänzend erzgrün, der häutige Randsaum zumal hinten sehr breit, rotgelb, seidenartig schimmernd, fein quergestreift. Die Afterdecke ist über ihrer Spitze leicht höckerartig gewölbt, zumal beim ♂, äusserst dicht mit queren Bogenstrichen und Höckerchen bedeckt, zumal an den Seiten, die daher einen matten seidenartigen Glanz haben, nur die Mitte vor dem Vorderrand ist glänzend polirt, weitläufig mit kurzen Querstrichen. Die Bauchringe sind in der Mitte weitläufiger, an den Seiten dicht quergestrichelt, ebenso die Brust, die dicht und mässig lang graugelb behaart ist. Die Forcepsform zeigt Fig. 5; ein Vergleich der Fig. 1–5 zeigt deutlich die nahe Verwandtschaft dieser 5 Arten, die alle zur Gruppe der *E. bicolor* Fabr. gehören.

Pseudomalaia pilifera Burm.

Die Type der Burmeister'schen Art ist ein ♂ unic., ist rotbraun mit grünem Erzschiller, zumal auf dem Kopf (wenig auf dem Clipeus), Thorax, und Schildchen. Die Deckflügel sind hell rotbraun, nur die Basis, der Rand neben dem Schildchen und neben der Schulter ist schwarzbraun. Die primären Rippen auf den Deckflügeln sind gut gewölbt und die Punkte der sie begrenzenden primären Punktreihen sind ringförmig, stets ohne Haare oder Borsten, während die Punkte, aus denen die ziemlich kurzen gelben Haare entspringen, sehr klein und einfach sind. Die Sculptur im Interstitium primum oder subsuturale, im Raum zwischen der Nahtrippe und zweiten primären Rippe, die in der Zwischennaht und Schulterspitzenbuckel verläuft, ist in dem queren Eindruck hinter dem Scutellum und im basalen Abschnitt davor undeutlich; hinter diesem finden sich darin zwei deutliche secundäre Rippen und zwischen diesen eine undeutliche schmale tertiäre. Die zweite und dritte primäre Rippe (die letztere innen neben der Schulter) tragen vereinzelte einfache feine Pünktchen. Die innere (grössere) Klaue an den Vorderfüssen ist gleichmässig dick und lang, an der Spitze gerade quer abgestutzt, an der oberen Kante eingeschnitten, mit einem feinen Zähnchen. Die Form des Forceps zeigt Fig. 9. Die Afterdecke ist gleichmässig dicht graugelb behaart.

Pseudomalaia tagala Heller.

Diese Art ist der *pilifera* Burm. sehr nahe verwandt, unterscheidet sich aber in folgenden Punkten. Die Färbung der Deckflügel ist entweder rein schwarzbraun (zuweilen mit bläulichem Schiller) oder, wenn rotbraune Flecken auftreten, erreichen sie nur am Hinterrand den Rand, die Naht, Basis, und der Seitenrand bleiben immer dunkel. Die primären Rippen sind stets punktfrei und die Behaarung der Deckflügel ist spärlicher. Die tertiäre Rippe zwischen den beiden secundären im Interstitium subsuturale ist bis nahe an die Basis deutlich ausgeprägt. Am Forceps, Fig. 8, sind die Parameren vor der Spitze deutlich eingeschnürt, die Spitze schärfer winklig abgesetzt, was besonders bei der Betrachtung von der Unterseite deutlich hervortritt. Die eigentümliche löffelartige Verlängerung der Ventralplatte des Mittelstückes am Forceps, die der *pilifera* und *tagala*[5] gemeinsam ist, kommt, auf der Abbildung des Forceps der *P. tagala* Heller in der *Deutschen Ent. Zeitsch.* (1891), Taf. III, fig. 17, nicht zur Darstellung; vielleicht ist sie bei der Präparation abgebrochen.

Es liegt mir aus der Gattung *Pseudomalaia* noch eine neue Art vor, deren Beschreibung ich weiter unten folgen lasse. Die bis jetzt bekannten 5 Arten der Gattung lassen sich nach dem folgenden Schema unterscheiden:

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[5] Herr Prof. Heller hat ein zweites typisches Exemplar seiner Art auf dieses Merkmal hin untersucht und sein Vorhandensein festgestellt.

Die Nahtrippe ist ganz punktfrei oder höchstens nahe der Spitze mit einigen kleinen Pünktchen .... 1.
Die Nahtrippe ist überall fein punktirt und behaart.......... 5.

1. Die Deckflügel sind gelbbraun ohne dunkle Umrandung, *immer gänzlich unbehaart;* im Interstitium subsuturale 2 secundäre Rippen, getrennt im ganzen Verlauf durch eine einfache Reihe von Augenpunkten .... semperi Kraatz.
2. Deckflügel glänzend braunschwarz mit einer kleinen, scharf begrenzten schiefen braungelben Makel, *die Behaarung ganz spärlich,* fast nur auf den Eindruck hinter dem Schildchen beschränkt; im Interstitium subsuturale zwischen den beiden secundären Rippen eine regelmässige tertiäre, die nur bei der Basis verloschen ist. Am Forceps die Ventralplatte des Mittelstückes in eine lange, nach abwärts gekrümmte Spitze ausgezogen .... whiteheadi sp. nov.
3. Deckflügel rein braunschwarz oder mit einer gelbbraunen Makel, die den Hinterrand erreicht, die Behaarung reichlicher, über die ganzen Deckflügel verbreitet; das Interstitium subsuturale im basalen Teil und in dem starken Eindruck hinter dem Schildchen so unregelmässig, dass hierdurch auch die innere secundäre Rippe ganz, die äussere zum Teil, verschwinden; nur im apicalen Teil sieht man auf eine kurze Strecke zwischen den beiden secundären Rippen eine schmale tertiäre; am Forceps die Ventralplatte des Mittelstückes oval, löffelartig ausgehölt, die Spitze zugerundet, kurz umgebogen, die Parameren vor der Spitze eingeschnürt .... tagala Heller.
4. Deckflügel hell braungelb, beim ♂ nur der Rand an der Basis neben Schulter und Schildchen fein schwarzbraun gesäumt (was beim ♀ fehlen kann?); im Interstitium subsuturale 2 secundäre Rippen, zwischen denen nur im apicalen Teil noch Reste einer schmalen tertiären sichtbar sind. Am Forceps ist die Ventralplatte des Mittelstückes wie bei der *tagala,* die Parameren jedoch sind nicht eingeschnürt, ihre Spitze ist breiter abgestutzt; die Nahtrippe an der Sptize, die zweite und dritte secundäre Rippe im ganzen Verlauf mit vereinzelten feinen Haarpünktchen .... pilifera Burm.
5. Die ganze Oberfläche ist überall mit feinen Haarpunkten bedeckt, die Haare länger als bei den anderen Arten; nur die primären Rippen noch regelmässig convex, die secundären in den Interstitien durch die dichte Punktirung mehr oder weniger verloschen. Flügeldecken hell braungelb mit schmaler schwarzbrauner Umrandung. Am Forceps die Ventralplatte des Mittelstückes in 2 seitliche Spitzen ausgezogen (fig. 10) .... flavopilosa Ohaus.

Pseudomalaia pilifera Burm., *P. tagala* Hell. und *P. whiteheadi* sp. nov. haben gemeinsam die Form und Farbe des Körpers, beim ♂ die Form der inneren Klaue an den Vorderfüssen, die nahezu gleichbreit, an der Spitze quer abgestutzt und an der oberen Kante fein eingeschnitten ist, sowie der äusseren Klaue an den Mittelfüssen, die an der Spitze nur äusserst fein, kaum sichtbar eingeschnitten ist. Sie unterscheiden sich durch Farbe, Behaarung, und Sculptur der Deckflügel, sowie die Form des Forceps. Bei der *P. semperi* ist die innere Klaue der Vorderfüsse kurz, in der Mitte stark verbreitert, vorn schief abgestutzt mit längerem Zähnchen an der oberen Kante, die äussere Klaue der Mittelfüsse kaum sichtbar eingekerbt. Bei der *P. flavopilosa* ist die innere Klaue der Vorderfüsse ziemlich schmal, in der Mitte kaum verbreitert, vorn schief abgeschnitten und tief gespalten, die äussere Klaue an den Mittelfüssen tiefer gespalten als bei allen anderen Arten.

Fig. 6 zeigt die Form des Forceps bei *P. semperi* Fig. 10, die der *P. flavopilosa.*

Pseudomalaia whiteheadi sp. nov.

Magnitude et statura *P. piliferae* Burm. et *tagalae* Hell., fuscobrunneus, parum nitidus, capite, thorace et scutello, pygidio et pedibus leviter viridiaeneis tarsis nigris; corpus supra et subtus cum pedibus sat dense, elytra in disco solum sparsissime flavo pilosa, elytra nigra macula flavobrunnea oblique discali ornata.

♂ ♀ Long. 7.5, lat. 4–4.5 mm. NORD LUZON (*J. Whitehead,* S.).

Dunkelbraun mit leichtem grünem Erzglanz, wenig glänzend, oben und unten ziemlich dicht graugelb behaart, die Deckflügel glänzend schwarz mit einer ziemlich scharf begrenzten rotgelben schiefen Makel auf der Scheibe. Kopfschild trapezförmig, braun, der Rand fein aufgebogen, dicht und ziemlich fein gerunzelt. Kopf mit feineren, Halsschild mit gröberen Bogenstrichen, beide nur hinten, am Hinterhaupt respectiv vor dem Schildchen mit einzelnen Punkten; dieses letztere dicht punktirt und behaart mit einer kahlen, glatten Schwiele in der Mitte der Basis. Deckflügel mit breitem und tiefem Quereindruck hinter dem Schildchen und je einem kleineren innen und aussen neben den stark vorspringenden Schultern, alle primären Rippen regelmässig gewölbt, glatt und kahl, begrenzt von regelmässigen Reihen von Augenpunkten, in allen Interstitien je 2 secundären Rippen, im subsuturalen zwischen den beiden secundären eine tertiäre Rippe, die nur an der Basis undeutlich ist; nur bei dem Quereindruck einige kurze gelbe Härchen, die aus kleinen Pünktchen, nicht aus den Augenpunkten, entspringen. Propygidium und Pygidium, Unterseite und Beine dicht und ziemlich fein getrichelt. Die Form des Forceps zeigt Fig. 7.

Andoretus luridus Blanchard.

Die Type dieser Art, die ich im Sommer 1911 im Pariser Museum untersuchen konnte, ist ein grosses ♀ von heller Färbung ohne dunkle Thoraxmakel und ziemlich reichlicher Behaarung, eine Form, die auch unter den ♀♀ seltener ist als die zumeist dunkleren Stücke mit schwarzbraunem Thorax und spärlicher Behaarung. Die ♀♀ sind fast immer grösser als die ♂♂ und ziemlich konstant in der Grösse, während die ♂♂ darin ziemlich variabel sind; die mir vorliegenden ♂♂, die ich aus einem ziemlich grossen Material ausgesucht habe, schwanken von 7–10, die ♀♀ nur von 10–10.5 mm.

A. philippinicus Pic dessen Type ich, dank der Liebenswürdigkeit des Autors, untersuchen konnte, ist nur ein kleines, dunkles ♂ von *A. luridus* Blanch., und muss daher als Synonym zu dieser Art gesetzt werden.

Die Art, die ich bisher nach der etwas kurzen und nicht ganz korrekten Beschreibung für die Pic'sche Art hielt, benenne ich *A. semperi*, weil ich sie schon früher unter diesem Namen in den Sammlungen bestimmt habe.

Adoretus semperi sp. nov.

Ex. affinitate *A. assimilis* Hope (*testaceus* Hope et *cribrati* White), minor, rufo testaceus pedibus antennisque flavis, sat dense ac breviter griseo-pubescens, elytra pilis longis albis singulis ornata.

♂ Long. 7–9, lat. 3.5–4.5; ♀ long. 8–10, lat. 4–4.5 mm.

LUZON (*C. Semper* Coll.); S. Luzon, Albay und Mittel Luzon (*J. Whitehead* Coll.).

In die Gruppe des *A. assimilis* und *cribratus* gehörend, in welcher auf den anliegend grau behaarten Deckflügeln sich einzelne lange Borsten erheben. Parallelseitig, flach gewölbt, rötlich scherbengelb, wenig glänzend, die Beine und Fühler hellgelb, der ganze Körper anliegend mässig dicht und kurz grau behaart, die Beine mehr abstehend gelb behaart, auf den Deckflügeln vereinzelte aufrechte weisse Borsten. Der Kopf und die Augen sind sehr gross, das Kopfschild fast halbkreisförmig, der Rand deutlich aufgebogen, schwarz, die Fläche wie die Stirn dicht runzelig, der Scheitel etwas weitläufiger punktirt, jeder Punkt mit einem Härchen. Die Oberlippe ist rötlich, das Rostrum schwarz, lang, sein Rand gekerbt, seine Mitte gekielt. Der Thorax ist in der Mitte nicht länger als Stirn und Scheitel, wie der letztere, punktirt und behaart; ebenso das Schildchen. Auch die Deckflügel sind überall dicht, an den Seiten runzelig punktirt; die primären Rippen sind zumeist, wenigstens auf der Scheibe, deutlich erhaben; die vereinzelten Borsten entspringen aus Punkten der primären Punktreihen. Die Behaarung der Afterdecke ist nahe der Spitze etwas länger und abstehend, nicht so auf der Brust. Die Beine sind kräftig, die Vorderschienen in beiden Geschlechtern 3-zähnig, die Tarsen und Klauen lang, die Fühler 10-gliedrig, die Keule beim ♂ etwas länger als beim ♀.

Adoretus umbrosus Fabricius.

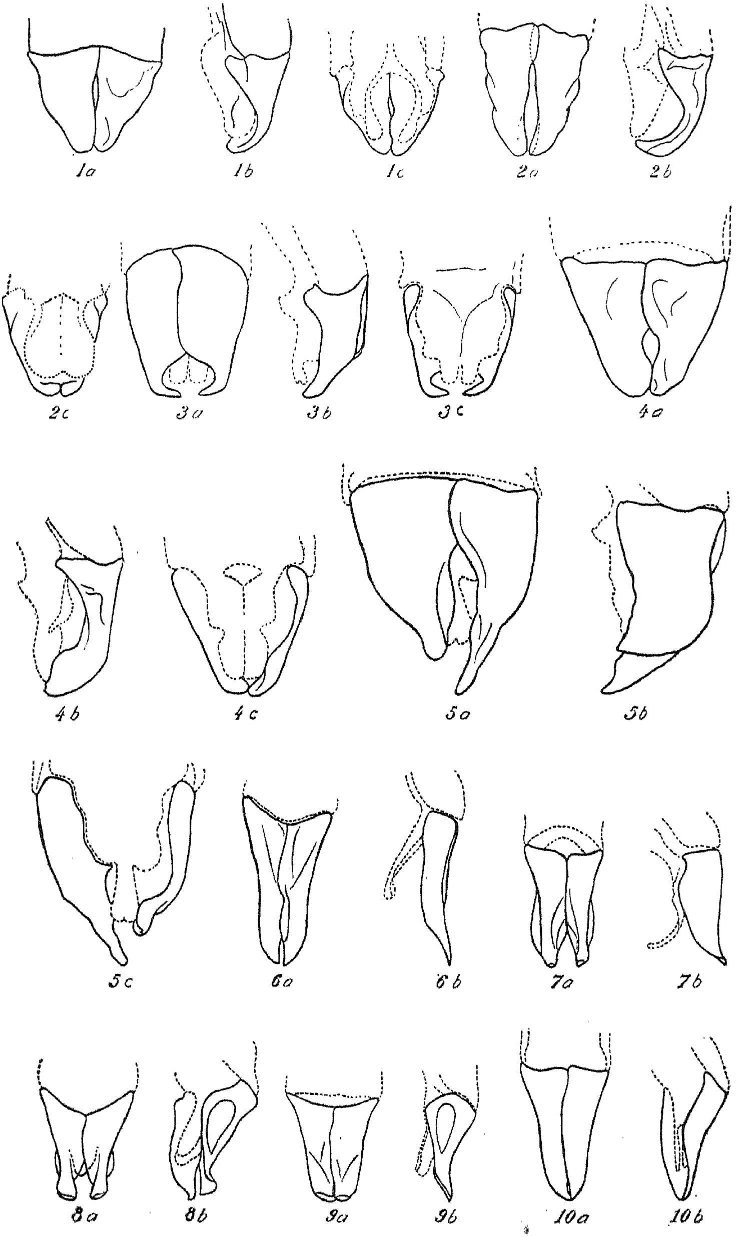
Diese Art, deren Type aus dem Kopenhagener Museum ich untersuchen konnte, stammt von Senegal und ist später von Castelnau als *hirtellus* und von Burmeister als *cinerarius* nochmals beschrieben worden. Die Art dagegen, die in den meisten Sammlungen und Verzeichnissen als *A. umbrosus* figurirt, muss den Namen *A. compressus* Weber führen. Die Weber'sche Type, die von Sumatra stammt, habe ich leider nicht ausfindig machen können, dagegen habe ich die Type des *A. compressus* Wiedemann aus Java in Händen gehabt, der sehr wahrscheinlich seine Art nach Kenntnis der Weber'schen Stücke beschrieben hat. Der *A. compressus* Weber respectiv Wiedemann, ist weit verbreitet. Ich besitze Stücke vom Kapland (*Drege*); Ile-de-France; S. Ceylon (*H. Fruhstorfer*), Mai, 1889; Madras; Cambodja; Singapur (*Atkinson*); Sumatra; Delhi; Java, Batavia; Borneo, Limbang, Niabang, Sarawak, Kuching, Barran Fluss, Kina-Balu, Tandjong-Banjermasin; Luzon (*J. Whitehead*); Celebes, Samanza (*H. Fruhstorfer*); Gilolo; Hawai, Honolulu. Wahrscheinlich ist der Käfer mit Kulturpflanzen, die nur durch Stecklinge vermehrt werden (Bananen, Zuckerrohr), verschleppt worden, wie wir dies von einer ganz nahe verwandten Art, dem *A. tenuimaculatus* Waterh. bestimmt wissen.

TAFEL I.

a, visus dorsalis; *b*, visus lateralis; *c*, visus ventralis.

FIG. 1. *Anomala* (*Euchlora*) *seticrus* Ohaus.
2. *Anomala* (*Euchlora*) *ceramopyga* Ohaus.
3. *Anomala* (*Euchlora*) *prasina* Burm.
4. *Anomala* (*Euchlora*) *smaragdina* Eschsch.
5. *Anomala* (*Euchlora*) *trigonopyga* Ohaus.
6. *Pseudomalaia semperi* Krtz.
7. *Pseudomalaia whiteheadi* Ohaus.
8. *Pseudomalaia tagala* Heller.
9. *Pseudomalaia pilifera* Burm.
10. *Pseudomalaia flavopilosa* Ohaus.

Die Ventralplatte des Mittelstückes des Forceps ist stets............ gezeichnet.



TAFEL I. CHARACTERE DES PYGIDIUMS DER RUTELIDEN.

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NOTES ON PHILIPPINE EDIBLE MOLLUSKS.

By ALVIN SEALE.

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Mollusks [1] are daily sold in Manila markets, and no one seems to be able to give any definite information about them. Filipinos, especially of the laboring class, depend largely upon these shell fish for their daily food, and it is obviously important that we should make a careful study of the most important mollusks, in order that we may devise means of cultivating and continuing the supply, and especially there should be careful supervision of oyster beds, in order that they may be free from contamination.

The mollusks treated of in this paper are merely the common forms that are constantly used as food by the Filipinos. Any species listed may be purchased in the Manila markets at almost any time. A detailed list of all the mollusks used for food in the Philippines would include practically every species known to occur here.

OYSTERS.

Three species of edible oysters are found in the Philippines. These are *Ostrea orientalis* Ch., *O. palmipes* Saub., and *O. pyxidata* Reeve. All are known as *talaban* in Tagalog and *timer* in Ilocano. They form an important food supply in the Philippines, being found in almost all the islands. Near Manila large oyster beds occur on the tide flats at Malabon; and, in fact, almost all the *esteros* of Manila Bay have their quota of oysters.

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[1] I do not claim to be a conchologist, and the identifications in this paper are the results of comparing specimens with identified species in the Quadras collection, and an examination of such literature as was available. Doubtless there are mistakes.

Large oyster beds are found along the south side of Manila Bay, where the cultivation of the mollusks receives considerable attention from the Filipinos. Almost all these beds are staked off as private claims, and a watchman is employed by the owners to prevent any serious thieving. In these beds small branches of bamboo are stuck in the mud as spat collectors. It is probable that these privately-controlled oyster beds have prevented the complete destruction of the Manila oyster industry by preserving the oysters until they are large enough to spawn. There is no law in force limiting the gathering of oysters.

The oysters found in the cultivated beds reach a length of from 12 to 14 centimeters, while shells 18 centimeters in length are not uncommon. Oyster beds of considerable extent and containing unusually well-flavored oysters are found in several localities in Palawan, especially in Malampaya Sound. No chart or survey of any kind has ever been made of the Philippine oyster beds except a preliminary inspection by the writer during the past year. They are well worth a thorough investigation, and no doubt the output could be greatly increased by proper cultural methods. An adaptation of the methods employed on the oyster farms at Arcachon, France,[2] could be inaugurated easily, especially in the oyster beds of Manila Bay.

The Manila Bay oyster is looked upon with considerable suspicion by the American population of this city, but, if fresh oysters are selected from the beds at a distance from the city and properly *cooked*, there is no reason why they should not be used as food.

In Manila markets, oysters sell for from 20 to 50 centavos[3] per liter, very small ones can be bought for 1 centavo per dozen. It is estimated that about 50 liters are sold each day. The method of handling oysters in the local markets is to be deplored, and should speedily be remedied. They are usually brought to the market husked, placed on or in a tin box where the proposed buyers run their fingers over them. The seller also frequently dips in an unclean hand and gives them a generous mixing. There is no doubt that oysters are taken from certain of the *esteros* quite near the city, especially one draining the district of Tondo where there is every possibility of their being infected by sewage. The gathering and sale of such oysters in the market should be prohibited.

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[2] Hornell, *Madras Fisheries Bull.* (1910), 1, 1 to 90, pls.

[3] One peso (100 centavos) Philippine currency equals 50 cents United States currency.

The shell of the oyster is used in some parts of Luzon for the manufacture of lime, the price paid being 2 pesos per cubic meter. At Malabon there are piles of old shells of fully 100 cubic meters, which will serve to indicate the extent of the oyster industry at that place.

SURF CLAMS.

The *calumismis, Tapes striatus* Chem. (Plate I, fig. 4), is easily distinguished by the narrow black lines which form reticulations on the sides and straight lines on the margins. It measures about 7 centimeters across the widest diameter. It is found buried in the sand along the beach in shallow water, apparently much scattered, not growing in regular beds. These clams sell for from 7 to 12 centavos per dozen in the market. They are usually secured in the greatest numbers during October.

HARD SHELL CLAMS.

There are at least two species of clams included under the names *halaan, patayog,* and *cabia.* One, *Tapes literata* Linn. (Plate I, fig. 2), is brownish pink to white, with about three broad, radiating, white stripes from the back to the margin of the shell; these stripes have dark margins. This is by far the most abundant mollusk to be found in the Manila market, and can be secured at any time. In size it is about 6 centimeters across the greatest diameter. The clams are secured chiefly on the Pasay beach near Manila, usually at low tide. After a heavy storm, thousands are washed ashore and the beds are greatly damaged. They sell in the market for 40 centavos per hundred. They make excellent soup. Another clam, also called *halaan, Tapes virginæ* Linn. (Plate I, fig. 3), is in shape and general appearance much like the above, except that the stripes radiating from the beak to the margin of the shell are black or purple. This is a finely flavored clam, and commands the same price in the market as *T. literata* Linn.

SAND CLAM.

The *saropsarop* or *daroparpar, Circe undatina* Linn. (Plate I, fig. 5), is not so abundant as the *halaan.* It is also of less width between the valves; its longest diameter is about 6 centimeters. It is yellowish white with black lines across the hinge margin and above the beak. It is a good, clean food and sells in the market for 10 centavos per kilogram. It is found in salt water on practically all sandy beaches of the Philippines.

PHILIPPINE LITTLE-NECK CLAM.

The *lucan, Cyrena suborbicularis* Phil. (Plate I, fig. 6), next to the *halaan,* is perhaps the most important species in the Philippines. It forms a large percentage of the food of the poorer people of Manila. The *lucan* is quite abundant in most of the mud flats and *esteros* throughout the Islands, being a brackish-water species that burrows in the mud. In color it is uniform dark greenish; the epidermis is roughened or velvety to the touch. This species is the largest of the clams commonly sold in the markets, being from 6 to 9 centimeters across its greatest diameter. It sells for 6 centavos per kilogram. The *lucan* is wholesome, when fresh, and makes an excellent chowder.

SMALL GREEN CLAM.

The *tulla, Psammobia togata* Slesh. (Plate II, fig. 1), is found in abundance by sifting the black sand of the river mouths; it seems to extend into the fresh water. The shell is green, and about 3 centimeters in greatest diameter. This clam is excellent for soup. It sells for 7 centavos per kilogram in the Manila markets.

RIDGED SAND CLAM.

The *camotpusa, Circe gibbea* Lk. (Plate II, fig. 2), is a rather small clam, usually measuring about 5 to 6 centimeters across its widest diameter. It is characterized by the strong ridges on the posterior half of the shell. These ridges gradually diminish in size posteriorly. The color is white with about 3 angular black bands crossing the hinge. This clam is abundant about Manila on sandy beaches which are exposed at low tide. It has a fine flavor. The market price is 6 centavos per kilogram.

ROCK CLAM.

The *bototoy, Cardium dule* Linn. (Plate II, fig. 3), is a small clam usually about 5 centimeters across its greatest diameter; the width between the valves is about 5 centimeters. The shell is strongly and uniformly ridged, with the greenish fuzz of the epidermis filling the space between each ridge except on the beak, where it is usually worn off, thus exposing the white shell. This clam is found on reefs or among rocks in shallow water. It is regarded as a good food, and sells for 7 centavos per kilogram. It is very unusual, however, to see it offered for sale in any large quantity.

"BUTIL."

The *butil, Cryptogramma squamosa* Linn. (Plate II, fig. 4), is a clam 2 to 3 centimeters in its greatest diameter, found in the salt water on sandy beaches, throughout the Islands. The strongly-ribbed shell is white and brown. This small clam is a common article of food for the natives living near the sea. It sells for 3 centavos per hundred and makes excellent soup.

VENUS CLAM.

The *kanturi, Cardium donaciforme* Speng. (Plate II, fig. 6), is a white clam about 4 centimeters in length, common on sandy, salt-water beaches. It is of little value, and sells for 3 centavos per hundred.

MINUTE SAND CLAM.

The *alamis, Dorax radians* Lk. (Plate II, fig. 5), is a white or bluish clam, measuring about 3 centimeters across its greatest diameter. It is very abundant on sandy beaches in shallow salt water. It sells for 5 centavos per kilogram in the local markets.

WAVED VENUS CLAM.

The *morans, Venus alta* Saw. (Plate II, fig. 7), is a small clam, and is not found in sufficient quantities to be of much importance. It is interesting because of the curious sculpturing of its shell which resembles a minute model of the terraces on the hills of Japan or in the Igorot country of the Philippines.

DUCK-BILL CLAM.

The *lutos, Anatina truncata* Linn. (Plate I, fig. 9), is found in abundance in the sand and mud of the shallow water of Manila Bay. It is easily distinguished by the long thick "neck" protruding from the posterior portion of the shell. The color is uniformly white; the shell is very thin, and ranges in size up to 8 centimeters or more. It is regarded as a good food and sells for about 10 centavos per kilogram in the local markets.

SUNSET AND TELLEN SHELLS.

Paros. (Plate II, fig. 9.) There are about 14 species of the genus *Tellina* found in the Philippines, all of which are used as food. They are found on sandy or muddy shores, in the *esteros* or near the entrances to streams. They are usually beautiful shells, being a delicate purple with radiating stripes extending from the beak to the margin of the shell. The usual size of our most abundant species is about 6 to 8 centimeters. Six species, *T. pellucida* Phil., *T. perplexa* Hem., *T. incerta* Desh., *T. capsoides* Lam., and *T. timorensis* Lam., are to be found in the local markets; they sell for 15 centavos per kilogram and make very good soup. The young are sometimes called *paros-parosan.* The *paros, Capsella elongata* Linn. (Plate II, fig. 8), is very similar to the above.

MUSSELS.

Tehong. There are about a dozen different species of mussels, family Mytilidæ, in the Philippines, representing at least three genera—*Mytilus,* the edible mussel; *Modiola,* the horse mussel; and *Lithodomus,* the rock-eaters. All are used as food in these Islands; perhaps the most abundant species is *Modiola matealfei* Hare. (Plate I, fig. 10.) They are found in the salt water usually attached to stones or piles. They are bluish or greenish, and from 4 to 13 centimeters in length. Their price in the local market is about 8 centavos per kilogram.

RAZOR CLAMS. FAMILY SOLENIDÆ.

There are three varieties of razor clams (*tikhan*) found in the Philippines. These are *Solenocurtus acurtidens* Brod. et Low., *Solen grandis* Dkr., and *Solen gracilis* Phil. (Plate II, fig. 10). The last-named species is the most abundant, being found on sandy or muddy beaches at very shallow depths. The shells are pale green, and measure about 7 to 8 centimeters in length by 1.5 centimeters in width. All are used as food and sell for 10 centavos per kilogram in the markets.

FRESH-WATER MUSSEL.

The *sulib, Anodonta tenius* Lea (Plate I, fig. 8), is common in the Pasig River. The shell is greenish brown, smooth, and about 8 to 10 centimeters in length. The inside is a beautiful mother-of-pearl color; however, the shell is too thin for the manufacture of buttons, and I have never known of a pearl being found in one of them. They are highly regarded as food by the native inhabitants, and sell in the local market for 6 centavos per kilogram.

"BALAY." TONGUE CLAM.

These strangely-shaped shells, *Lingula anatina* Linn. (Plate I, fig. 11), are found in great abundance on Pasay beach, especially after a heavy storm, when they are secured by thousands. They are used as food, but care should be exercised to get them perfectly fresh, as otherwise they are apt to produce gastric trouble. They sell in the local market for 6 centavos per hundred.

HORN SHELL.

The *bangongon, Telescopium telescopium* Linn. (Plate II, fig. 12), is a large, dark brown, cone-shaped shell, found in Manila Bay in salt or brackish water; usually on a mud bottom in shallow water. It is regarded as good food by the natives and frequently sold in the local market. There are at least 25 species of this family (Cerittindæ) found in the Philippines. Most of the individuals are very small. All are used as food. One species called *suso, Potomides sulcatus* Born (Plate II, fig. 13), is often sold in the local market at 5 centavos per kilogram. It is found in brackish water on a mud bottom. Perhaps the most abundant species is one called *susong-puti* or *bayongon, Cerithium rhizoporarum* A. D. (Plate II, fig. 11), a shell about 5 centimeters in length. It is yellowish with dark lines. These shells almost invariably have the tip broken off, and the tail of the animal protruding. They are sold in the local market for about 5 centavos per kilogram.

STROMBUS SHELLS.

The *palagsi, Strombus canarium* Linn. (Plate II, fig. 15), is quite common in Manila Bay. It prefers shallow water and a sandy bottom. It is used as food, selling for 6 centavos per kilogram in the local markets. There are at least 30 species of this family (Strombdæ) found in the Philippines.

WHELK.

The *alaunghuga, Melongena cochlidium* Linn. (Plate I, fig. 7), is 8 to 10 centimeters in length, deep chestnut in color, and is very common in Manila Bay. The animal is used for food.

BLEEDING TOOTH SHELLS.

The family Neritidæ (Plate II, fig. 14) is represented by a great number of species which are very abundant in the Philippines. The local name is *sihi.* All are small shells usually much striped or highly colored. The children of the natives gather quantities of these animals for food. The species most frequently seen in the local market is *Neritina pennota* Bonn. which is picked up from shallow water along almost any beach near Manila.

FRESH-WATER MOLLUSKS.

The *suso,* black river-snail (Plate II, fig. 16), and the *cohol,* green river-snail (Plate II, fig. 17), are apparently the only two fresh-water mollusks (except *Anodonta tenius*) sold in the local markets; however, these are quite abundant and sell for about 6 centavos per kilogram.

In addition to the shells named, there are other species of mollusks which are only occasionally found in the Manila market, but which are of considerable importance as food in other islands of the Archipelago, such as the various species of *Murex* (Muricidæ), tritons (Tritonidæ), spindle shells (Tuscidæ), volutes (Volutidæ), olives (Olividæ), cones (Conidæ), helmet shells (Cassididæ), turbin shells (Turbanidæ), top shells (Trochidæ), and abolons (Haliotidæ). A complete list of these species together with an account of their habits, abundance, times of breeding, methods of reproduction, and notes regarding the possibilities of their culture would be a most desirable and useful work.

ILLUSTRATIONS.

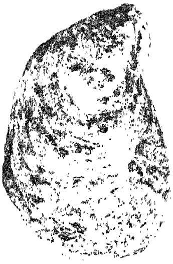
(From photographs by Charles Martin.)

PLATE I.—PHILIPPINE EDIBLE MOLLUSKS.

FIG. 1. *Talaban*, oyster (*Ostrea orientalis* Ch.).
2. *Halaan*, patayog, cabia, hard shell clam (*Tapes literata* Linn.).
3. *Halaan*, hard shell clam (*Tapes virginæ* Linn.).
4. *Calumismis*, surf clam (*Tapes striatus* Chem.).
5. *Saropsarop*, sand clam (*Circe undatina* Linn.)
6. *Lucan*, little-neck clam (*Cyrena suborbicularis* Phil.).
7. *Alaunghuga*, whelk (*Melongena cochlidium* Linn.).
8. *Sulib*, fresh-water mussel (*Anodonta tenius* Lea).
9. *Lutos*, duck-bill clam (*Anatina truncata* Linn.).
10. *Tehong*, mussel (*Modiola metealfei* Hare.).
11. *Balay*, tongue clam (*Lingula anatina* Linn.).

PLATE II.—PHILIPPINE EDIBLE MOLLUSKS.

FIG. 1. *Tulla*, small green clam (*Psammobia togata* Slesh.).
2. *Camotpusa*, ridged sand clam (*Circe gibbea* Lk.).
3. *Bototoy*, rock clam (*Cardium dule* Linn.).
4. *Butil*, lesser ridged clam (*Cryptogramma squamosa* Linn.).
5. *Alamis*, minute sand clam (*Dorax radians* Lk.).
6. *Kanturi*, venus clam (*Cardium donaciforme* Speng).
7. *Morans*, waved venus clam (*Venus alta* Saw.).
8. *Paros* (*Capsella elongata* L.).
9. *Paros*, sunset shell (*Tellina incerta* Desh.).
10. *Tikhan*, razor clam (*Solen gracilis* Phil.).
11. *Susong-puti*, horn shell (*Cerithium rhizoporarum* A. D.).
12. *Bangongon*, horn shell (*Telescopium telescopium* Linn.).
13. *Suso*, horn shell (*Potomides sulcatus* Born.).
14. *Sihi*, bleeding tooth shell (*Neritina pennota* Bonn.).
15. *Palagsi*, strombus shell (*Strombus canarium* Linn.).
16. *Suso*, black river-snail (*Helicidæ*).
17. *Cohol*, green river-snail (*Helicidæ*).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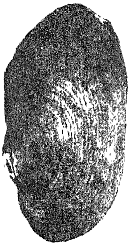
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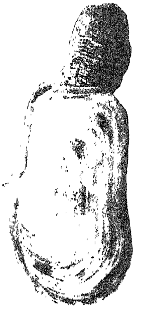
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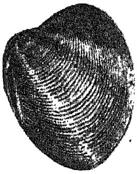
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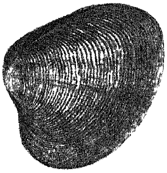
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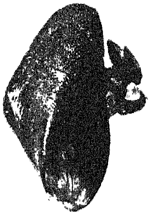
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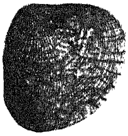
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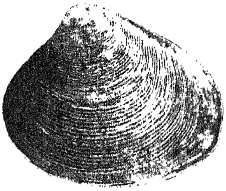
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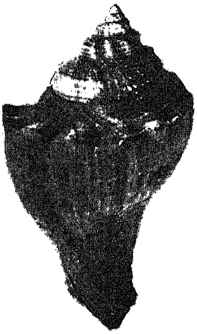
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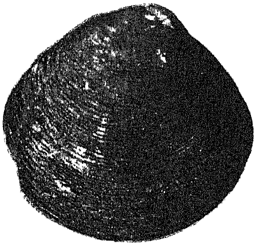
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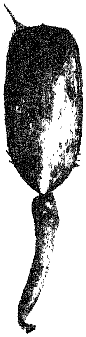
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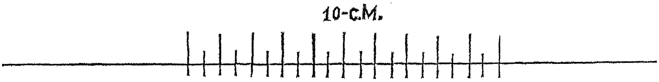

PLATE I. PHILIPPINE EDIBLE MOLLUSKS.

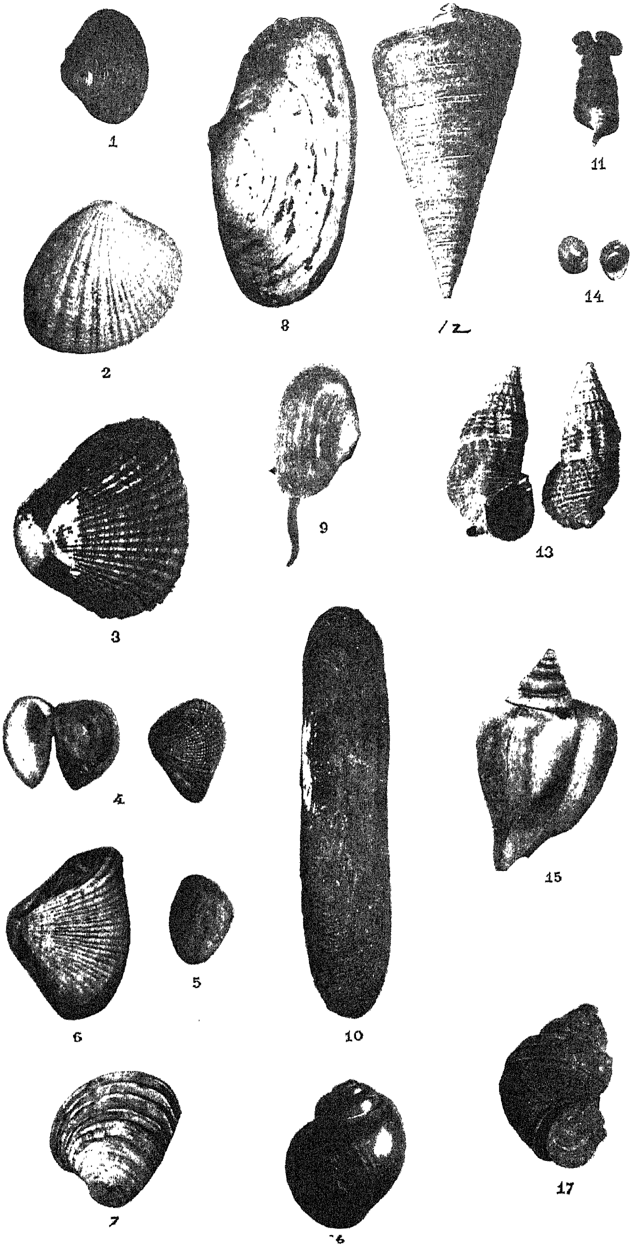

PLATE II. PHILIPPINE EDIBLE MOLLUSKS.

THE PHILIPPINE JOURNAL OF SCIENCE,
D. General Biology, Ethnology and Anthropology.
Vol. VII, No. 4, 1912.

DESCRIPTION OF A NEW ACANTHOCYBIUM FROM THE PHILIPPINE ISLANDS.

By ALVIN SEALE.

(From the Ichthyological Section, Biological Laboratory, Bureau of Science, Manila, P. I.)

Acanthocybium forbesi Seale sp. nov. Forbes' Kingfish. (Plate I.[1])

Head 4 in length without caudal; depth 7.3; eye 10 in head, 5 in snout; dorsal XXVI 1119, 9; anal II 10, 8. The lateral line has its origin considerably above the opercles and is strongly curved under the 14–17 dorsal spines. In the posterior portion of its course the line is wavey. Between the strong curve of the line and the caudal, it gives off numerous short vertical branches, 77 above and 80 below the main line. These branches consist of true mucous canals with pores and with 2 rows of thin scales on each side; they are of various lengths, unbranched, and lie in a vertical plane, the lower branches extending half the distance to the anal fin and the upper branches half the distance to the dorsal fin. The lateral line proper is accompanied on each side by a narrow series of long thin scales.

The eye is located directly above the base of the mandible. The lower jaw is pointed and slightly the longer. The maxillary is attached in such a manner as to admit of considerable movement of the upper jaw. Each jaw has a single row of rather large compressed teeth which are rounded at the top. The teeth are very small at the tip of the jaw, but increase in size, posteriorly, to 12 millimeters in length; vomer and palatine somewhat roughened, but without teeth; opercle rounded with a very inconspicuous point posteriorly; preopercle toothed;

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[1] In our figure of this species the vertical branches of the lateral line are emphasized, and the true lateral line shows but three rows of scales whereas there should be six.

pectoral fins on median line of the body, their origin on a line with the origin of the ventrals and of the spinous dorsal, being midway between the tip of the snout and the base of the 20th dorsal spine; length of pectoral is 1.90 in head; ventral 4.10 in head; spinous dorsal long, and free from the soft dorsal, its anterior spine the longest, being 5 in head. The remaining spines are but slightly less in length until the 23rd spine is reached. The 24th to 26th are graduated. Longest ray of soft dorsal 4.5 in head; its origin midway between the origin of spinous dorsal and the end of the caudal vertebra. There are 9 free, distinct pinnules, with 1 additional pinnule attached by membrane to the soft dorsal. Origin of anal directly below the 7th ray of the soft dorsal; the length of anal rays equal to rays of dorsal. There are 8 free pinnules behind the anal fin with 1 additional pinnule attached to the fin. The origin of the anal is slightly nearer the end of the caudal vertebræ than to tip of ventrals. The caudal fin is falcate with the middle rays slightly projecting.

The caudal peduncle is strongly keeled, with the addition of 2 small oblique keels on base of caudal fin.

The head is naked; a narrow corslet of thin scales surrounds the anterior portion of the body and embraces the base of pectorals and of ventrals; a narrow line of scales along base of spinous dorsal; a rather wide area of long thin scales on the belly, extending back to the origin of the anal, this area being of greater width than the distance between the base of ventrals. These scales are very distinct, being about 8 millimeters in length by 1 millimeter in width.

Color in life, a beautiful steel-blue above, becoming lighter on sides and below; the dense scaled area of belly being fulvous; some beautiful dark blue vertical stripes on sides, which disappear within a few moments after the fish is taken from the water; the dorsal is dark blue; the caudal is bluish; the ventrals, pectorals, and anal are white, the tip of the anal being slightly shaded with gray; the head is colored similar to the body.

Type is No. 7253; length, 1.7 meters (64 inches); weight, 29.5 kilograms (65 pounds); caught off the coast of Leyte by Dean C. Worcester, August, 1911.

Named in honor of Governor-General W. Cameron Forbes in recognition of his interest in the development of the fisheries of the Philippine Islands.

Upon my first examination of this fish, I regarded it as being identical with the species called *Cubium sara* Benn., from the Loo Choo Islands, but after carefully looking up all the descriptions and literature[2] relating to this species (now called *Cybium solanderi* Cuv. and Val.), I am convinced that this species is distinct.

The most striking features of *A. forbesi* are the peculiar, long thin scales on the belly and the branches of the lateral line, points of which I am sure the numerous careful naturalists who have examined *C. solanderi* (*C. sara*) would not have failed to mention in their descriptions. Also Jordan and Evermann described *A. solanderi* as having serrated teeth. The teeth of our specimen are apparently smooth. The above and several other points of differences, especially in the location of the fins, seem to make it necessary to describe our specimen as a distinct species.

[2] Bennett, in Beechey's Voyage Zool. (1849), 63, Pl. 20, fig. 2.

Cuvier and Valenciennes, Histoire Naturelle des Poissons (1831), 8, 141.

Gunther, Fische der Südsee (1876), 2, Taf. 94, Figs. A und B; Cat. Fishes Brit. Mus. (1860), 2, 373.

Doderlein, Grom de Sc. Nat. Ed. Ecom. (1872), 8.

Jordan and Evermann, Fishes of North and Middle America (1896), Part I, 876, Bull. U. S. Fish Comm. (1903), Pl. 1, 176.

ILLUSTRATION.

PLATE I.

Acanthocybium forbesi Seale. Forbes' Kingfish. (Drawing by Espinosa.)

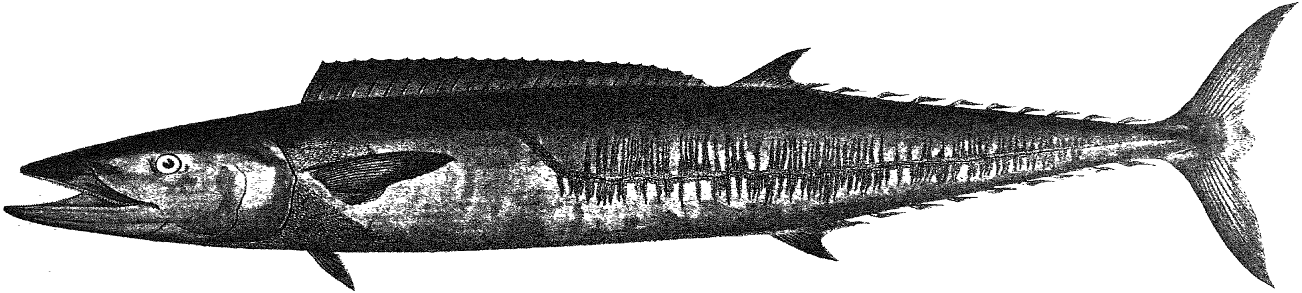

PLATE I. ACANTHOCYBIUM FORBESI Seale.

THE PHILIPPINE JOURNAL OF SCIENCE,
D. General Biology, Ethnology and Anthropology,
Vol. VII, No. 4, 1912.

EDITORIAL.

SOME POISONOUS PHILIPPINE FISHES.

The following letters serve to call our attention to the fact that death resulting from eating certain species of fish is of occasional occurrence in the Philippine Islands.

SIR: I have the honor to send you a bottle containing a small specimen of the poisonous fish known among the Moros as *tinga-tinga* and among the Filipinos as *botete*. This is the first specimen I have been able to get since the last case of poisoning which resulted in the death of a little girl and the narrow escape of several members of the family. The first effect after eating the fish is a dizziness and sickness at the stomach, but if the latter does not occur at once the victim, if he yields to his inclination and lies down and sleeps, will soon be aroused, vomit and soon expires. There have been so many fatalities among the Moros on account of eating the *tinga-tinga* that the people are careful. They say that if the head of the fish is cut off at once and the entrails removed the fish may be cooked and eaten.

In the case of the fatality to which reference is made, the woman who cooked the fish knew of its dangerous character, but thought she had taken all necessary precautions. The little girl, a visitor in the house, ate of the fish, was seized with the dizziness, and leaving the meal, lay down and slept a short time, when she was seized with an attack of vomiting and died in a few moments. All members of the family were seized with the well-known effects and vomited all night. These eventually recovered.

We have another poisonous fish in these waters and its use is as equally dangerous as the *tinga-tinga*. It is called in the Moro "loco."

(Signed.) SAMUEL D. CRAWFORD,
Governor of Basilan.

SIR: I have the honor to inform you that at the sitio of Kamayá in this municipality, several cases of poisoning caused by a fish commonly known as "*botete*" have occurred, the victims being Roque Noruega, Lorenzo Noruega, Genoveva Noruega, Ciriaco Noruega, Petra Sales, Fernando Noruega, Matias Noruega, Proceso Useñas, Antonio Tamora, Amada Useñas, Pomposa Useñas, Carmen Useñas, and Francisco Villarin. These persons, without any thought of evil, ate of the fish mentioned yesterday afternoon between 5 and 6 o'clock, and from the effects thereof the youth Fernando Noruega died last night between 11 and 12, and the boy Matias Noruega this afternoon between 2 and 3 o'clock. Petra Sales is in a very serious condition.

All survivors have been given the necessary aid and treatment by the physician in charge of the quarantine station.

(Signed.) VALENTIN SEMILLA,
Municipal President.

DECEMBER 11, 1911.

The fish called *tinga-tinga* or *botete* in the above communications is the black-spotted puffer, *Spheroides sceleratus* (Forster) (Fig. 1). It belongs to the family Tetraodontidæ. There are 14 species of this family found in the Philippines; all of them are supposed to secrete a specific poisonous alkaloid which gives rise to gastric trouble of a very serious nature when taken into the stomach of man.

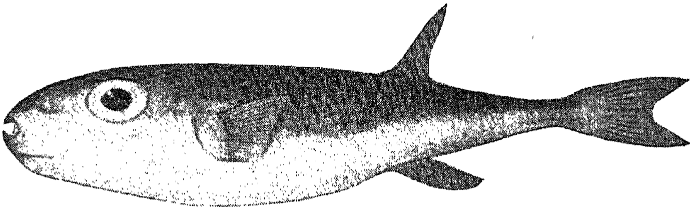

FIG. 1. "Tinga-tinga" or "botete."

These fishes are common all over the tropical Pacific; they are usually found in shallow water, and under ordinary conditions are sluggish in their movements. When one is captured, it distends its stomach until it resembles a ball. Their color is usually white below, with black dots, stripes, or bands on the sides and back. In length they range from 2 to 20 centimeters.

The fish called "loco" in the first letter belongs to the family Diodontidæ, or porcupine fish, called *botiting laot* in Tagalog. There are 3 species of this family found in Philippine waters, all believed to be poisonous.

In addition to the above, there are 7 species of Balistidæ, or trigger fishes, called *papaco,* and 10 species of Monacanthidæ, or file fishes, called *pacol,* which should be regarded with grave suspicion.

There is very little danger of an American or European eating any of these fishes, as their appearance and smell are offensive, and they are too small to be desirable for the table.

Nearly all the natives of the Islands know that these fishes are poisonous, but either because of the peculiar flavor, or because of the ease with which they are caught, the fish are often eaten, and usually with deplorable results.

The treatment of a person who has eaten poisonous fish is promptly to empty the stomach of the patient with an emetic, such as tepid salt water or mustard. Then a stimulant such as whisky or *vino* should be given. In case of collapse, artificial breathing should be employed.

ALVIN SEALE.

ILLUSTRATION.

TEXT FIGURE.

FIG. 1. *Tinga-tinga* or *botete*, *Spheroides sceleratus* (Forster). (Drawing by Espinosa.)

THE PHILIPPINE
JOURNAL OF SCIENCE
D. GENERAL BIOLOGY, ETHNOLOGY
AND ANTHROPOLOGY

VOL. VII OCTOBER, 1912 NO. 5

PHILIPPINISCHE RÜSSELKÄFER.

Von K. M. HELLER.
(Dresden, Germany.)

Die folgenden Beiträge zur Kenntniss der Rüsselkäferfauna der Philippinischen Inseln stützen sich im wesentlichen auf die Sammlungen des Bureau of Science in Manila, die mir in der frei- und langmütigsten Weise von dem Governments Entomologist Herrn Charles S. Banks zur Verfügung gestellt wurden.

Da es aber ein geringes Verdienst ist die Artzahl artenreicher Gattungen durch Einzelnbeschreibungen zu vergrössern, ohne das verwandtschaftliche Verhältniss der neuen Art zu allen übrigen bereits bekannten zu erörtern, der gewissenhafte Systematiker aber auf alle Fälle darauf bezügliche Vorstudien machen muss, so wurde in Nachfolgendem, so weit als möglich, das Ziel erstrebt, die Gattungen allgemein, oder doch wenigstens inbezug auf die philippinischen Arten erschöpfend zu behandeln. Zu solchem Unternehmen reichte natürlich auch nicht die Miteinbeziehung des mir zur Verfügung stehenden Materiales des Königlichen Zoologischen Museums, Dresden, aus; es wurden daher tunlichst auch andere öffentliche und private Sammlungen zur Untersuchung herangezogen, deren Verwaltern, beziehentlich Besitzern, für ihr liebenswürdiges Entgegenkommen der wärmste Dank ausgesprochen sei. Es sind die Herren:

G. J. Arrow, London; Dir. Prof. Dr. Brauer und Prof. H. Kolbe, Berlin; Desbrocher des Loges, Tours; Dr. H. Dohrn und Dr. G.

Enderlein, Stettin; Dr. L. v. Heyden, Frankfurt a. M.; Kustos S. Schenkling und P. Pape, Berlin; C. Ritsema Czn., Leiden; G. Severin, Brüssel; Prof. Dr. Y. Sjöstedt, Stockholm; A. Solari, Genua; und Dr. H. J. Veth, Haag.

Mit Ausnahme von *Pachyrrhynchus lacunosus, rugicollis* v. *crucifer, chevrolati* v. *jagori,* und *Metapocyrtus mimicus* sind alle hier beschriebenen Arten im Dresdener Museum vertreten. Der Kürze wegen wurden für die Angabe der Institute und Sammlungen in denen die Arten, die mir zur Zeit der Beschreibung vorlagen, vorhanden sind, folgende Abkürzungen gebraucht:

Bur. Sci. Acc. No.	Bureau of Science, Manila, Accession number.
Br. M.	British Museum (Natural History), London.
D. E. M.	Deutsches Entomologisches Museum, Berlin-Dahlem.
M. Berol.	Königliches Museum für Naturkunde, Berlin.
M. Brux.	Musée Royal d'Histoire Naturelle à Bruxelles.
M. Dr.	Königliches Zoologisches Museum, Dresden.
M. L.	s'Rijks Museum van Natuurlijke Historie, Leiden.
M. Senck.	Museum Senckenbergianum, Frankfurt a. M.
M. St.	Pommersches Museum, Stettin.
c. Sol.	Sammlung Angelo Solari, Genua.

PACHYRRHYNCHIDÆ.

Keine andere Rüsselkäfergruppe dürfte die der brachyderiden *Pachyrrhynchidæ,* die nach Leconte[1] wegen der fehlenden Mandibelnarbe nunmehr den *Sitones* anzugliedern ist, an Farbenpracht übertreffen, oder an allgemein wissenschaftlichem Interesse gleichkommen. Erstere, die jedem Laien auffallende Prächtigkeit des Gewandes, die häufig durch metallisch grüne, broncefarbige, oder glutrote Körperfarbe mit teilweise brillanter oder doch farbiger Schuppenzeichnung zustandekommt, kann in jeder grösseren Sammlung, oder in Ermanglung einer solchen, an der jüngst von L. von Heyden[2] veröffentlichten naturgetreuen Farbentafel bewundert werden.

Letzteres, das wissenschaftliche Interesse, kann nur allmälig durch Vertiefung unserer Artkenntniss erweckt und gefördert werden und ist bisher nur im geringen Umfang auf diese Rüsselkäfergruppe hingelenkt worden, weil mit den zwei bunten Gattungsconglomeraten: *Pachyrrhynchus* und *Apocyrtus* sensu aut. der Systematiker wenig, der spekulative Zoologe, vor allem der Tiergeograph, nichts anzufangen wusste und dennoch dürfte kaum eine andere Rüsselkäfergruppe zu so vielseitigen Betrachtungen anregen wie diese.

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[1] *Proc. Amer. Phil. Soc.*, The Rhynchophora of America, north of Mexico (1876), 15, 113.

[2] 42. Bericht der Senckenbergischen Naturforschenden Gesellschaft. Frankfurt a. M. (1911), Heft 1.

Solche hier in erschöpfender Weise anzustellen, liegt nicht im Rahmen einer systematischen Arbeit wie der vorliegenden, doch soll wenigstens in Kürze der Momente gedacht werden, die allgemeiner Beachtung wert scheinen.

Die geographische Verbreitung erscheint seit Aufteilung der Gattung *Pachyrrhynchus* und *Apocyrtus* in einem ganz anderen Licht wie bisher und eröffnet eine Reihe von Ausblicken von einiger Bedeutung, zumal es sich ja durchwegs um ungeflügelte Formen von geringem Artveränderungsvermögen handelt. Im äussersten Osten, an der Nordostküste Australiens, im Salomo- und Bismarkarchipel, sowie auf Neu-Guinea sehen wir die Gattung *Pantorhytes* Faust verbreitet, im Westen wird sie, von den Molukken ab, durch die Gattung *Pachyrrhynchus* ersetzt, die sich über Sangi auf die ganzen Philippinen verbreitet und im Norden, unter Ausschluss von Formosa, bis auf die südliche Insel Ishigakishima der Lu Chu Inselgruppe erstreckt. Zwischen diese beiden Gattungen schiebt sich sowohl räumlich, wie systematisch, die Gattung *Sphenomorpha* Behrens ein, die auf Neu-Guinea und den Molukken vorkommt und zwar auf letzteren in einer Art *Sphenomorpha fasciata* Faust, die dem ebenfalls dort vorkommenden *Pachyrrhynchus morotaiensis* v. Vollh. (= *waterhousei* Faust) so ähnelt, dass ihr enger genetischer Zusammenhang mit diesem kaum zu bezweifeln ist. Wenn daher die Drs. P. und F. Sarasin nach ihren umfassenden Studien (Materialien zur Naturgeschichte der Insel Celebes III, Wiesbaden 1901) zu dem Ergebniss gelangen, dass zwischen den Molukken und den Philippinen keine direkte Verbindung bestanden hat, sondern die Elemente der molukkanisch-papuanischen Fauna nur über Celebes nach den Philippinen gelangen konnten, so steht die erwähnte Verbreitung von *Pachyrrhynchus* und *Sphenomorpha* dieser Annahme entgegen und bedarf daher noch genauerer Untersuchung.

Wahrscheinlich erreichte die Expansion der Pachyrrhynchiden erst in jüngster geologischer Zeit den philippinischen Archipel, der durch seine grössere territoriale Ausdehnung und sein Erstrecken über 15 Breitegrade zu reicher Artentfaltung führte.

Die in einzelnen Arten ebenfalls *Sphenomorpha* ähnelnde, sonst nur auf die Philippinen beschränkte Gattung *Metapocyrtus* m. (*Apocyrtus* autor.) findet sich, einem unbeschriebenen von R. Wallace in Manado gesammelten Stücke (sp. nov., unicum im Brit. Mus. London) zufolge, auch in Nord-Celebes; eine mit *Meta-*

pocyrtus nahe verwandte Gattung (*Apocyrtidius* m.) ist der einzige Pachyrrhynchidæ,[3] der auf Nord-Borneo (Kina Balu) vorkommt und wohl sicher ein Einwanderer vom Norden her—zwei, in tiergeographischer Beziehung sicherlich bemerkenswerte Tatsachen. Im Vergleich zu der papuanischen Gattung *Rhinoscapha* haben die Pachyrrhynchiden demnach bei ihrer Wanderung von Osten nach Westen einen ganz anderen Weg genommen; erwähnte Gattung reicht von Neu-Guinea über die Molukken, unter Ausschluss von Borneo, über Süd-Celebes bis auf Java und Sumatra. Ein heute noch nicht zu erklärender Gegensatz, der vielleicht darauf hindeutet, dass die Expansion der Pachyrrhynchiden möglicherweise in entgegengesetzter Richtung als die der nunmehr zu den Leptopsiden [4] zu stellenden Gattung *Rhinoscapha* erfolgt sei.

Die Schuppenzeichnung und ihre Variabilität, sowie die Veränderlichkeit der Körpergrundfarbe bieten ebenfalls noch ein grosses Feld für Spezialuntersuchungen. Namentlich ist bei dem engen genetischen Zusammenhange der Arten die erstere wohl geeignet, über ihr allmäliges Zustandekommen Aufschluss zu bringen. Bei den schwarzen Formen, wie *morio* und *tristis*, beobachtet man eine eigene Art primitiver Schuppen, die unpigmentiert ist und aus deren Mittelpunkt eine Borste entspringt; bei den weiter differenzierten Arten sind diese Schuppen unbeborstet, kompakter, oft linsenförmig und reich pigmentiert, sie treten erst in Längsstreifen z. B. bei *lacunosus, modestior*, u. a. auf, verdichten sich stellenweise makelartig bei *dohrni*, um endlich isolierte Schuppenmakeln zu bilden (*psittacinus, smaragdinus*, u. a.) die an Grösse zunehmen und bei grösserer Ausbreitung eine Schuppenverdichtung an der Makelperipherie zeigen (*congestus*) die zur Ringzeichnung von *argus* hinüberleitet. Die Deckenquerbinden scheinen überall aus einer Verschmelzung von Querreihen von Schuppenmakeln hervorgegangen, eine sorgfältige Auswahl geeigneter Stücke von *rugicollis, stellulifer, monilifer, chevrolati, gemmans, orbifer, jugifer*, und deren Varietäten ergibt eine fast lückenlose Reihe die von einer ungebänderten Form zu einer führt, bei der die Querbinden derartig verbreitert sind, dass sie den grössten Teil der Decken einnehmen. Bei ähnlichen Betrachtungen wie den erwähnten zeigt sich dass das Halsschild gleichsam in der Differenzierung der Zeichnung vorauserbt (*rugicollis* var. *crucifer*). Noch interessanter ist die augenblicklich noch unerklärliche Erscheinung der Aehnlichkeit der Schuppenzeichnung von Arten verschiedener Pachyrrhynchiden-Gattungen, die am besten beweisen dürfte, dass nicht alles was sich täuschend ähnlich sieht, in das Kapitel Mimicry zu verweisen ist; eine Reihe solcher Arten seien hier nebeneinander gestellt:

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[3] Ein Exemplar von *Pachyrrhynchus smaragdinus* Behrens in der Sammlung A. Solari, Genua (ex coll. van de Poll.) trägt die sehr unwahrscheinliche Fundortangabe: Brunei, N. O. Borneo.

[4] *Cf.* Faust, *Ann. Mus. Genova* (1899), 40, 7.

Pachyrrhnchus nobilis.	*Metapocyrtus mimicus.*
Pachyrrhynchus monilifer.	*Metapocyrtus pseudomonilifer.*
Pachyrrhynchus erichsoni.	*Metapocyrtus schönherri.*
Pachyrrhynchus anellifer.	*Pseudapocyrtus schadenbergi.*
Pachyrrhynchus gemmatus.	*Eupachyrrhynchus superbus.*
Apocyrtus inflatus.	*Pseudapocyrtus exsectus.*

Abgesehen von dem Schuppenkleid ist aber auch die Grundfärbung des Körpers bei manchen, namentlich metallischen Arten, grossen, individuellen Abänderungen unterworfen, indem z. B. die Arten *modestior, gemmatus, schönherri, metallicus,* u. a. ihr metallisches Kleid, ganz analog der philippinischen Bockkäfergattung *Aprophata* Pascoe, zuweilen bis zu schwarz verdüstert zeigen (*gemmatus* var. *atratus* n.). Zu dieser Variabilität des Schuppenkleides und der Körperfarbe kommt aber noch die Hinfälligkeit der Schuppen und deren postmortale Farbenunbeständigkeit hinzu, die es oft fast unmöglich machen eine Art wieder zu erkennen. Namentlich die metallisch grünen Schuppen können durch Infiltration mit Schmutz und Fettstoffen eine Kobaltblaue Färbung annehmen (*Metapocyrtus rugicollis* Chevr. *harpago* sp. nov.) oder wohl infolge des Copulationsactes derartig partiell abgerieben sein, dass eine schwarze Querbänderung bei einer sonst einförmig beschuppten Art (*Metapocyrtus bituberosus* und *virens*) zustande kommt.

Unerlässliche Vorbedingung zur Bestimmung der Arten ist aber neben gutem Erhaltungszustand der Tiere die sichere Erkennung des Geschlechtes.

Die secundären Geschlechtscharaktere (namentlich bei den Apocyrtiden, Pachyrrhynchiden, mit die Augenmitte überragendem Fühlerschaft) erfordern daher ein aufmerksames Studium, zumal da sie nicht nur von Gattung zu Gattung, sondern von Art zu Art in ganz ungewöhnlicher Weise wechseln, so dass als einziges durchgreifendes und verlässliches Merkmal nur die bauchige Wölbung des Metasternums und 1. Ventralsternites, die beim ♂ etwas abgeflacht sind, für das ♀ angesehen werden muss. Bei der Gattung *Pachyrrhynchus* sind die Weibchen meist nur durch breitere, gedrungenere Körperform, seltener noch durch einen seitlichen Längseindruck auf dem Analsternit und etwas mehr nach unten gezogene Nahtspitze ausgezeichnet. Bei den Apocyrtiden dagegen gibt es kaum einen Körperteil, der nicht in auffälliger Weise verschieden in den beiden Geschlechtern ausgebildet ist. Um einige Beispiele herauszugreifen sei erwähnt dass der Rüssel in besonders auffälliger Weise bei dem Weibchen von *Metapocyrtus erichsoni* Chevr. (=*gibbirostris* Waterh.) durch eine höckerartige Anschwellung an der Wurzel ausgezeichnet ist, die dem Männchen durchaus fehlt, dass das Halsschild bei dem Weibchen von *Metapocyrtus bambalio* fast regulär 6-eckig, beim Männchen kugelig, bei anderen Arten wie *granifer* und *brevicollis* im männlichen Geschlechte viel grösser und gewölbter ist als bei dem weiblichen und bei dem *dolosus*-Weibchen in der Mitte einen geglätteten Längsstreifen aufweist, der dem Männchen fehlt. Noch merkwürdiger sind jedoch die an den Flügeldecken zu beobachtenden Auszeichnungen die den Weibchen zukommen, neben der breiteren und gewölbteren Deckenform der Weibchen kommen nämlich nicht nur verschiedene Formen der Nahtspitzen, die bald einzeln bald gemeinsam zugespitzt und entweder nach unten gezogen, oder nach aufwärts gekrümmt, oder an der äussersten Spitze ausgerandet oder abgestutzt sein kann, sondern auf dem 2. Drittel der Nahthöcker oder Borstentuberkel vor, die bei einigen Arten (*M. tumoridorum* Chevr. ♀) so gross sind, dass sie die Deckenspitze hinten überragen und die Längswölbungslinie des letzten Deckendrittels concav (Taf. I., Fig. 26a), dagegen die Deckenbildung des Männchens von gewöhnlicher Bildung ist, nur bei der Untergattung *Homalocyrtus* tritt in sofern eine Umkehrung des Verhältnisses ein als die Flügeldecken des Männchens bei einer Art abgeflacht und im zweiten an der Naht höckerartig nach hinten ausgezogen sind, so dass das letzte Drittel der Längswölbungslinie fast rechtwinkelig und concav abfällt (Taf. I., Fig. 29).

Was die Beine betrifft, so sind allgemein die Hinterschenkel des Männchens (seltener auch die Vorderschenkel) länger als die des Weibchens indem sie die Deckenspitze meist sehr deutlich überragen, was bei dem Weibchen nicht der Fall ist.

Ganz besonders auffällig jedoch ist die Reduktion der Anzahl der Abdominalsternite, die bei den Weibchen vieler Arten zu beobachten ist, gewöhnlich sind das 1. und 2. Bauchsternit entweder nur in der Mitte, oder ganz mit einander verschmolzen, so dass das Abdomen nur aus 4 Sterniten zu bestehen scheint; bei anderen Arten ist das 3. und 4. Sternit ganz rückgebildet, häutig und nach innen gefaltet, so dass nur drei Abschnitte (*Pseudapocyrtus imitator*) gezählt werden können. Am eigenartigsten ist aber die Bildung beim Weibchen von *Apocyrtus inflatus* Er., die schon Waterhouse[5] erwähnt; das vorletzte und drittletzte Sternit ist nämlich bei dieser Art lamellenförmig und letzteres schuppenartig über das erstere geschoben, dieses ist dreieckig zugespitzt und erreicht mit seiner Spitze den Hinterrand des Analsternites, jenes, das drittletzte, ist zungenförmig und an der Spitze tief winkelig ausgeschnitten. Welche Rolle diese Lamellen, die sich wahrscheinlich bei der Flexion des Abdomens nach unten vertikal aufrichten, spielen, bleibt späteren Beobachtungen an lebenden Objekten vorbehalten, möglicherweise dienen sie bei der Copulation als Stützapparate.

Übersicht der Pachyrrhynchiden-Gattungen.

a^1. Rüssel höchstens mit feiner Basalquerfurche, meist ganz ohne solche, sein Spitzenteil oberseits meist quer wulstartig verdickt.

b^1. Rüssel in der Spitzenhälfte angeschwollen, sein Rücken in der Basalhälfte breit und flach eingedrückt.

c^1. Fühlerschaft den Augenhinterrand nicht erreichend, Flügeldecken eiförmig gewölbt.

d^1. Fühlerfurche scharf begrenzt, rinnenartig, auf die Rüsselunterseite herabgebogen. Episternalnaht der Hinterbrust der ganzen Länge nach gefurcht .... **Pachyrrhynchus** Germ.

d^2. Fühlerfurche hinten zu einem breiten dreieckigen Eindruck erweitert, dessen Oberrand nach der Augenmitte, dessen Unterrand nach der Unterseite des Rüssels gerichtet ist, Episternalnaht der Hinterbrust nur vorn eingedrückt.
Sphenomorpha Behrens.

c^2. Fühlerschaft den Augenhinterrand erreichend, Flügeldecken in beiden Geschlechtern etwas flach gedrückt.
Eupachyrrhynchus gen. nov.

b^2. Rüssel in der Spitzenhälfte nicht angeschwollen, ohne grossen Dorsaleindruck, meist mit Mittelfurche.

e^1. Augen nahezu halbkugelig vorgequollen.

f^1. Fühlerschaft den Augenhinterrand nicht erreichend, Rüssel nur wenig länger als breit .... **Pantorhytes** Faust.[6]

f^2. Fühlerschaft den Augenhinterrand überragend, Vorderbrust in flachem Bogen ausgerandet, Flügeldecken kugelig aufgetrieben ohne erhabenen Basalrand (mit nur einer Art: *inflatus* Er.).
Apocyrtus Er.

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[5] *Ann. & Mag. Nat. Hist.* (1843), I, 11, 250.

[6] Zu der von mir in der *Wien. ent. Zeitg.* (1905), 24, 305, synoptisch behandelten, auf das papuanisch-australische Gebiet beschränkten, Gattung gehört ausser den dort erwähnten Arten auch *Pachyrrhynchus stanleyanus* White, zu den als Synonym *Pantorhytes proximus* Faust zu ziehen ist.

e^2. Augen mässig gewölbt.
  g^1. Oberrand der Fühlerfurche geleistet, Rüssel sowohl der Quere als der Länge nach sanft gewölbt, nach der Spitze zu an Höhe abnehmend .... **Pseudapocyrtus** gen. nov.
  g^2. Oberrand der Fühlerfurche nicht leistenartig erhaben.
    h^1. Hinterschenkel unbewehrt.
      i^1. Rüsselrücken eben, nur mit mehr oder weniger deutlicher Mittelfurche, Hinterschenkel die Decken nicht, oder nur wenig überragend, Hinterschienen am Innenrand mit entfernt gereihten, meist stumpfen und dicken Dornhöckern, 1. und 2. Bauchsternit in der Mitte ganz mit einander verschmolzen .... **Macrocyrtus** gen. nov.
      i^2. Rüsselrücken mit breitem Längseindruck, Hinterschenkel die Deckenspitze deutlich überragend, Hinterschienen höchstens fein gedörnelt .... **Nothapocyrtus** gen. nov.
    h^2. Hinterschenkel vor der Spitze unterseits mit spitzem Dorn bewehrt, Vorderhüften ganz zusammenstossend.[7]
a^2. Rüssel mit Basalquerfurche.
  k^1. Rüssel im Spitzenteil quer wulstartig verdickt, Augen vorgequollen, am Oberrand mit Furche, Fühlerschaft kurz, den Augenhinterrand bei weitem nicht erreichend (mit einer Art: *chlorophanus* m. aus Borneo) .... **Apocyrtidius** Heller.
  k^2. Rüssel im Spitzenteil nicht angeschwollen, Augen nicht vorgequollen, Fühlerschaft mindestens den Augenhinterrand erreichend.
Metapocyrtus gen. nov.
    l^1. Rüssel so lang wie breit, quadratisch oder trapezoidal, die Seiten rechtwinkelig abfallend, der Länge nach gewölbt und durch eine tiefe Querfurche von der gewölbten Stirn getrennt.
Artapocyrtus subgen. nov.
    l^2. Rüssel länger als breit.
      m^1. Seitenrand des Rüsselrückens kantig, an der Wurzel fast rechtwinkelig abfallend.
        n^1. Rüsselrücken der ganzen Länge nach gewölbt, mässig dicht punktiert, ohne Spur von Längsleisten, der abgesetzte Halsschildvorderrand verbreitert sich an den Seiten nach unten zu.
          o^1. Halsschild punktiert, ringsum mit deutlicher Vorderrandfurche, Vorderbrust flach ausgerandet.
Sphenomorphoidea subgen. nov.
          o^2. Halsschild gekörnt, seine Vorderrandfurche oberseits ganz erloschen, der nach unten leicht verbreiterte Halsschildvorderrand an der Grenze der Vorderbrust plötzlich abgebrochen, letztere daher deutlich ausgerandet.
Sclerocyrtus subgen. nov.
        n^2. Rüsselrücken geradlinig verlaufend, Halsschild meist nicht gekörnt, sein Vorderrand bald ringsum gleich schmal, oder bald nach unten zu verschmälert, bald verbreitert.
Orthocyrtus subgen. nov.

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[7] Die *Apocyrtus* ähnlichen Arten, die möglicherweise auf diese Stelle der Tabelle leiten, sind zufolge der sichtbaren Maxillarlade den *Scythropinen* zuzuzählen und gehören der Gattung *Isopterus* Faust, *Ent. Zeitg.* Stett. (1895), 56, 4, an.

m^2. Seitenkanten des Rüsselrückens ganz verrundet.

p^1. Flügeldecken elliptisch, oder eiförmig gewölbt, in der Regel mit geleistetem Basalrand, selten oberseits abgeflacht, dann aber immer mit erhabenem Basalrand.

q^1. Flügeldecken mehr oder weniger gereiht-punktiert, nie gekörnt .... **Metapocyrtus** s. str. subgen. nov.

q^2. Flügeldecken mehr oder weniger dicht gekörnelt. **Trachycyrtus** subgen. nov.

p^2. Flügeldecken oberseits abgeflacht, ohne erhabenen Basalrand, ihre grösste Breite häufig hinter der Mitte, Halsschild immer gekörnelt............ **Homalocyrtus** subgen. nov.

Übersicht der Pachyrrhynchus-Gruppen.

a^1. Halsschild entweder überall zerstreut beschuppt, oder in der Mitte der Scheibe mit einfacher oder doppelter oder zu einer rhombischen Schlinge erweiterten beschuppten Querlinie, ist diese jederseits zu einem Punkt reduziert, dann mit beschuppter Mittellinie, oder mit ungefähr rhombischer, die Scheibe umschreibender Schuppenlinie oder endlich in der Mittellinie mit zwei parallelen Schuppenlinien. **Gruppe V.**

Hierher gehören: *rugicollis* Waterh., *crucifer* sp. nov. (oder var. von *rugicollis?*), *cumingi* Waterh., *decussatus* Waterh., *phaleratus* Waterh., *stellio* sp. nov., *chevrolati* Eyd. et Soul. = (*chlorolineatus* Waterh.) *monilifer* Germ., *stellulifer* subsp. nov., *gemmans* Chevr., *jugifer* Waterh., *orbifer* Waterh. = (*inornatus* Waterh.) *bifasciatus* Waterh., *reticulatus* Waterh., *circulatus* sp. nov., *speciosus* Waterh.,[8] *latifasciatus* Waterh.

a^2. Halsschild weder zerstreut beschuppt, noch in der Mitte mit einfacher oder doppelter beschuppter Querlinie, noch mit rhombischem Schuppenring oder doppelter Schuppenlängslinie.

b^1. Halsschild ohne Schuppenmakeln, oder Schuppenstreifen, höchstens sein Vorder- und Hinterrand beschuppt, häufig ganz kahl (wenn überall zerstreut beschuppt, siehe Gruppe V) .... **Gruppe I.**

Hierher gehören: *ochroplagiatus* sp. nov., *eques* sp. nov., *morotaiensis* Vollh., Tijdschr. v. Ent. (1864), 169[9] = [*waterhousei* Faust, Ent. Zeitg. Stett. (1895), 95], *forsteni* Vollh. loc. cit., 168, *infernalis* Fairm., Bull. Soc. ent., France (1897), 70.

b^2. Halsschild mit Schuppenmakeln oder Schuppenlängsstreifen nie mit Querstreifen, an den Seiten stets ohne Schuppenringe.

c^1. Halsschild in der Mitte der Scheibe mit quer gestelltem Schuppendoppelpunkt .... **Gruppe VI.**

Hierher gehören: *elegans* Waterh., *multipunctatus* Waterh. = (*auroguttatus* Chevr.).

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[8] Abgebildet in Semper: Die natürlichen Existenzbedingungen der Thiere, Leipzig (1880), 2. Theil, 236, Fig. h.

[9] Es werden nur bei jenen Arten die Citate ihrer Beschreibungen gegeben, die weder in Gemminger und Harold's Catalog noch in Baer's Catalogue des Coléoptères des Îles Philippines, in *Ann. Soc. ent. France* (1886), 97, aufgeführt sind.

c^2. Halsschild in der Mitte der Scheibe ohne Doppelpunkt, an der Wurzel immer ohne Mittelmakel, Decken makelartig beschuppt, wenn ohne Makeln dann tief gefurcht .... **Gruppe III.**

Hierher gehören: *pinorum* Pasc. = (? *subcostatus* Chevr.). *pinorum* var. *transversalis* nov., *tristis* sp. nov., *lacunosus* sp. nov., *psittacinus* sp. nov., *perpulcher* Waterh., *erichsoni* Waterh. = (*eschscholtzi* Waterh. ♀), *chrysocompsus* sp. nov., *croesus* R. Oberth. Ann. Mus. Genova (1879), 14, 570, *venustus* Waterh. = (*rufo-punctatus* Waterh.), *smaragdinus* Behrens, Ent. Zeitg. Stett. (1887), 253, *schönherri* Waterh.

c^3. Halsschild in der Mitte der Scheibe ohne Doppelpunkt meist ohne Mittelmakel an der Wurzel, Decken immer streifenartig beschuppt. **Gruppe II.**

Hierher gehören: *möllendorffi* K. M. Hell., Abh. Ber. Mus. Dresden (1898–9), No. 8, 5, *gloriosus* Faust, Ent. Zeitg. Stett. (1895), 7, *nobilis* sp. nov., *modestior* Behrens, Ent. Zeitg. Stett. (1887), 240 *pulchellus* Behrens, loc. cit., 238, *inclytus* Pasc., Journ. Linn. Soc. Zoöl. (1871), 11, 155, *semperi* sp. nov., *dohrni* Behrens, Ent. Zeitg. Stett. (1887), 236.

c^4. Halsschild immer mit Mittelmakel an der Wurzel, Decken makelartig beschuppt, fast immer mit 1–2 Suturalmakeln .... **Gruppe IV.**

Hierher gehören: *morio* sp. nov., *congestus* Pasc. = (*luteoguttatus* Chevr.), *immarginatus* Kraatz, Deutsche Ent. Zeitschr. 1888), 28, *coerulans* Kraatz, loc. cit., 29, *viridans* sp. nov., *chlorites* Chevr. = (*rutilans* Behrens, loc. cit., 247), *lorquini* Chevr. = *flavopunctatus* Kraatz = *flavomaculatus* Kraatz, per errorem, loc. cit., 30 u. 32), *gemmatus* Waterh. = (*ignipes* Chevr.), *purpureus* Kraatz, loc. cit., 31, *sanchezi* sp. nov., *sarcitis* Behrens loc. cit., 246, *roseomaculatus* Waterh., *striatus* Waterh.

b^2. Halsschild an den Seiten mit häufig einander tangierenden Schuppenringen .... **Gruppe VII.**

Hierher gehören: *annulatus* Chevr., *anellifer* n. n. [für *annulatus* Behrens, Ent. Zeitg. Stett. (1887), 256], *argus* Pasc.

Gruppe I.

a^1. Halsschild oberseits, auch auf dem Vorder- und Hinterrand, ganz ohne Schuppen.

b^1. Flügeldecken ganz ohne Schuppen, einfarbig schwarz. **infernalis Fairm.**

b^2. Flügeldecken schwarz, von oben besehen, mit je einer grossen basalen Makel und je zwei subapicalen Makeln, von gelber Farbe, von letzteren ist die äussere nach vorn verschoben, ausserdem, von oben nicht sichtbar, mit einer zweiten basalen, einer postmedianen und einer kleinen apicalen Randmakel........ **1. ochroplagiatus sp. nov.**

b^3. Flügeldecken erzfarben von oben besehen, mit je einer kobaltblauen Basalmakel und im Spitzendrittel mit einer Querreihe von je 2 ebenso gefärbten, runden Makeln, eine dritte von oben nicht sichtbare, derselben Reihe, ist nach hinten, eine 4. marginale Makel nach vorn verschoben .... **2. eques sp. nov.**

a^2. Halsschild auf dem Vorder- und Hinterrand, letzterer in der Mitte zuweilen unterbrochen, beschuppt.

*c*¹. Flügeldecken mit ununterbrochener medianer Querbinde, die sich hinten auf dem Seitenrande fortsetzt und in Form einer quer gestellten Schlinge wieder nach vorn umbiegt, ausserdem, nahe der Basis, mit einer von der Naht unterbrochenen Querbinde. Vorderrand des Halsschildes breiter als der Hinterrand beschuppt.
morotaiensis Vollh.

*c*². Flügeldecken mit an der Naht unterbrochener, medianer Schuppenquerlinie, die zwar ähnlich wie bei vorigem verläuft, aber vom Seitenrande ab pünktchenartig aufgelöst ist, nahe der Basis nur mit einer Querreihe von 3–4 Punkten.......................... forsteni Vollh.

GRUPPE II.

*a*¹. Flügeldecken in der Mitte mit quer über die Naht laufender Schuppenlinie.

*b*¹. Vorder- und Hinterrand des Halsschildes nicht ganz beschuppt.

*c*¹. Längsschuppenstreifen innerhalb des Halsschildseitenrandes ganz. Der humerale Schuppenlängsstreifen der Decken endet mit seiner Vereinigung mit dem queren Schuppenstreifen. Käfer schwärzlich, am Kopf und Beinen mit purpurnem Schimmer.
möllendorffi K. M. Hell.

*c*². Längsschuppenstreifen innerhalb des Halsschildseitenrandes unterbrochen. Der humerale Schuppenlängsstreifen der Decken ist über die Schuppenquerlinie hinaus verlängert und vereinigt sich mit (oder nähert sich sehr) dem kurzen Ast, den der subsuturale Schuppenstreifen im letzten Viertel nach vorn und aussen entsendet. Käfer metallisch glutrot.................................. gloriosus Faust.

*b*². Vorder- und Hinterrand des Halsschildes der ganzen Breite nach beschuppt. Flügeldecken in der vorderen Hälfte mit parabolisch gekrümmter in der Mitte mit querer Schuppenlinie, letztere setzt sich längs der hinteren Seitenrandhälfte fort und biegt in der Nähe der Naht nach vorn um, erreicht aber die quere Schuppenlinie nicht.

*d*¹. Rüsselseiten vor den Augen ohne Längsgrube. Halsschild etwas breiter als lang, kugelig. Flügeldecken purpuren kupfrig, oder erzfarben, kurz eiförmig. Die feine Längsschuppenlinie innerhalb des Halsschildseitenrandes hängt mit dem beschuppten Halsschildhinterrande zusammen. Decken vor der Spitze des 4. und 6. Spatiums gewöhnlich mit kurzem Schuppenstrich.
3. nobilis sp. nov.

*d*². Rüsselseiten vor den Augen mit Längsgrube, so dass die Rüsselseitenkanten wulstartig abgesetzt sind, Halsschild länger als breit, in der Basalhälfte mit relativ breitem, vom Basalrand getrennten Längsschuppenstreifen. Flügeldecken gestreckt-elliptisch, schwarz, 6. Spatium in der hinteren Hälfte mit einem meist vorn mit der Querbinde zusammenhängendem Schuppenlängsstreifen.
4. semperi sp. nov.

*a*². Flügeldecken in der Mitte ohne durchgehende Schuppenquerlinie, dagegen mit beschuppten Längsstreifen, die, sehr selten unterbrochen, von der Wurzel bis zur Spitze reichen.

*e*¹. Mit Schuppenstreifen innerhalb des Halsschildseitenrandes die den Vorderrand nicht erreichen, sie sind etwas nach innen gekrümmt und vorn leicht verbreitert. Mitte der Halsschildwurzel häufig mit kurzer Schuppenlängslinie. Körperfarbe apfelgrün bis schwarz. modestior Behrens.

Hierher gehört sehr wahrscheinlich eine mir in natura unbekannte Form, die in der Mitte der Decken eine Querreihe aus 2–3 Schuppenmakeln und an der Nahtspitze, sowohl als auch hinten an den Deckenseiten, Schuppenstrichelchen haben soll. Trifft diese meine Vermutung zu, dann ist *modestior* Behrens (1878) als Varietät aufzuführen von dem 1871 beschriebenen...................... inclytus Pasc.

*e*². Mit Schuppenstreifen innerhalb des Halsschildseitenrandes, die von der Wurzel bis zum Vorderrand reichen, häufig sind sie in der Mitte eingeengt, oder unterbrochen, immer findet sich aber dann auf dem Vorderrande wenigstens eine Makel. Körperfarbe glutrot bis schwarz, Schuppenstreifen veränderlich, namentlich der discale (zwischen Subsuteral- und Lateralstreifen verlaufende) vorn bald mehr oder weniger abgekürzt, oder zu wenigen Strichelchen reduziert, oder nur durch einen länglichen Schuppenpunkt angedeutet. pulchellus Behrens.

*e*³. Ohne Schuppenstreifen innerhalb des Halsschildseitenrandes, Vorderecken mit Schuppenquermakel, Mitte des Basalrandes mit meist dreieckiger Makel, Decken schwarz, mit 4 breiten grünlichen Schuppenstreifen von denen der zweite hinten und vorn stark abgekürzt, der erste vorn und hinten etwas makelartig erweitert und daselbst mehr rötlich golden beschuppt ist.......... dohrni Behrens.

GRUPPE III.

*a*¹. Flügeldeckenspitze dicht neben der Naht mit einem hinten sich meist verbreiternden und vertiefenden Furcheneindruck, der aussen von einer wulstigen Längsfalte begrenzt wird.

*b*¹. Flügeldecken tief gefurcht, mit rippenartig erhabenen Zwischenräumen, Halsschild ohne Schuppenmakeln.

*c*¹. Flügeldecken mit je 7 ganzen Längsrippen, die Naht breit glatt, hinter der Mitte und vor der Spitze mit kleinen elliptischen in der Mitte längsgekielten Eindrücken........................... pinorum Pasc.

*c*². Flügeldecken in der hinteren Hälfte des glatten Nahtstreifens mit 2 vorn verbundenen Furchen, so dass jede Decke 7 ganze und eine halbe Längsrippe aufweist.... 4a pinorum Pasc. var. dimidiatus nov.

*c*³. Flügeldecken mit in der Mitte durch ein breites glattes Querband unterbrochenen Längsrippen........ 5. pinorum var. transversalis nov.

*b*². Flügeldecken fein gefurcht, oder glatt.

*d*¹. Flügeldecken fein gestreift mit Makeln aus unpigmentierten Schuppen, Halsschild an den Seiten, hinter der Mitte, mit einer Längsmakel .... 6. tristis sp. nov.

*d*². Flügeldecken in der vorderen Hälfte mit bandartigen, vertieften und unpigmentiert beschuppten Längsstreifen, in der hinteren Hälfte mit eben solchen Längsmakeln, Halsschild an den Vorderecken mit Makeln .... 7. lacunosus sp. nov.

d^3. Flügeldecken ohne vertiefte Streifen, mit Ausnahme eines breiten kahlen Suturalstreifens, der hinter der Mitte und vor der Spitze eine kleine Schuppenmakel trägt und in der Mitte von einer breiten Kahlbinde durchquert wird, blass spangrün beschuppt. 8. psittacinus sp. nov.

a^2. Flügeldecken an der Spitze neben der Naht ohne Furcheneindruck.

e^1. Halsschild an den Vorder- und Hinterrücken mit je einer runden Schuppenmakel, Rüsseleindruck mit Mittelfurche, Naht ohne gemeinsame Schuppenmakeln, Decken schwarz, mit 18 in drei Querreihen angeordneten rot grün und gelb schillernden Schuppenmakeln. perpulcher Waterh.

e^2. Halsschild nur jederseits innerhalb des Seitenrandes mit länglicher oder runder Schuppenmakel.

f^1. Decken an der Naht ohne gemeinsame Schuppenmakeln, Rüsselrücken in der Mitte des Eindruckes mit Längsfurche.

g^1. Halsschild mit runder Seitenrandmakel, die 2. und 3. Makelquerreihe mit je 2–3, beziehungsweise 3–4 runden Makeln, Käfer schwärzlich oder erzfarben ...... erichsoni Waterh.

g^2. Halsschild in der vorderen Hälfte jederseits mit verkehrt kommaförmiger Längsmakel, deren vorderes spitzes Ende nach innen gekrümmt ist ...... 8a. erichsoni var. chrysocompsus nov.

f^2. Decken hinter der Mitte auf der Naht, häufig auch vor der Spitze mit gemeinsamer Doppelmakel, zweite Makelquerreihe im Bogen nach hinten und nach dem Seitenrand ziehend.

h^1. Halsschild an den Vorderecken mit Schuppenquermakel. croesus R. Oberth.

h^2. Halsschild an den Vorderecken ohne Schuppenquermakel.

i^1. Flügeldecken glänzend kupferrot, 2. Querreihe aus 2 runden Makeln und einer länglichen Randmakel bestehend, die mit der Apicalmakel zusammenfliesst ...... schönherri Waterh.

i^2. Flügeldecken schwarz mit rötlichen, blass lilafarbigen, oder weisslichen Makeln ...... venustus Waterh.

i^3. Flügeldecken schwarz mit grünlichen Makeln. smaragdinus Behrens.

GRUPPE IV.

a^1. Flügeldeckenmakeln durch Längsschuppenstreifen mit einander verbunden, Halsschild an den Vorderecken mit einer queren, in der Mitte der Wurzel mit einer, ungefähr dreieckigen Schuppenmakel. (Siehe den in Gruppe II eingereihten ...... dohrni Behrens.)

a^2. Flügeldeckenmakeln nicht durch Schuppenstreifen verbunden.

b^1. Flügeldecken nur an der Wurzel und vor der Spitze mit je 2 Makeln aus unpigmentierten Schuppen, Halsschild glänzend, Decken matt schwarz ...... 9. morio sp. nov.

b^2. Flügeldecken mit 3 bis 4 Querreihen von pigmentierten Schuppenmakeln.

c^1. Flügeldecken ohne vertiefte Längsstreifen.

d^1. Die dritte, gewöhnlich die vorletzte Makel der 2. Makelquerreihe der Decken ist nach vorn, die 2. etwas nach hinten verschoben.

e^1. Die Deckenmakeln berühren sich gegenseitig und sind an den Rändern dichter und rötlich, nach dem Mittelpunkt zu immer kleiner und spärlicher graugrün beschuppt.... congestus Pasc.

e^2. Die Deckenmakeln berühren sich nicht und sind einfarbig beschuppt.

f^1. Die Makeln sind grösser als die unbeschuppten Zwischenräume .... immarginatus Kraatz.

f^2. Die Makeln sind kleiner als die unbeschuppten Zwischenräume.

g^1. Körperfarbe rein schwarz.

h^1. Halsschild in beiden Geschlechtern länger als breit, Schuppenmakeln blass kobaltblau, selten grösser als das Auge .... coerulans Kraatz.

h^2. Halsschild des ♀ so lang wie breit, Makeln blass grün beschuppt, die an der Deckenbasis deutlich grösser als das Auge .... **10. viridans sp. nov.**

g^2. Körper bläulich, oder purpurn schwarz.

i^1. Alle Deckenmakeln kreisrund oder kurz elliptisch. chlorites Chevr.

i^2. Wenigstens einige Makeln sehr in die Länge gezogen, die am Seitenrande häufig zu einem Streifen zusammengeflossen, Decken kürzer und höher gewölbt als bei voriger Art .... lorquini Chevr.

d^2. Die 3 inneren Makeln der 2. Querreihe bilden eine nahezu gerade Linie.

k^1. Die 2. Makelquerreihe der Decken besteht aus je 4, 3 rundlichen und einer länglichen weiter nach hinten reichenden Marginalmakel, alle Makeln grünlich und rotgoldig umrandet. gemmatus Waterh.

Mit schwarzer Grundfärbung der Decken. **11. gemmatus var. atratus nov.**

k^2. Die zweite Makelquerreihe besteht aus 3 Schuppenmakeln, 2 rundlichen in einer Querlinie stehenden und einer weiter nach hinten gerückten länglichen Marginalmakel.

l^1. Purpurn-kupfrig, mit mässig grossen runden grünen Schuppenmakeln, Länge 13 mm .... purpureus Kraatz.

l^2. Glänzend schwarz, mit sehr grossen brillant schimmernden grünen Schuppenmakeln, von denen die an der Basis so gross sind, dass der Zwischenraum zwischen ihnen kaum Schienenbreite beträgt, sowohl Rüsselgrube als Stirn mit Schuppenmakel, Länge 16 mm .... **12. sanchezi sp. nov.**

k^3. Die zweite Makelquerreihe der Decken besteht aus nur 3 rundlichen Makeln, die längliche Marginalmakel fehlt, Spitzenteil mit 3 im Dreieck gruppierten Makeln.... sarcitis Behrens.

c^2. Flügeldecken deutlich punktiert gestreift.

m^1. Flügeldecken mit 11 rosafarbigen Längsmakeln, von denen die gemeinsame an der Naht verkehrt herzförmig ist. roseomaculatus Waterh.

m^2. Flügeldecken ähnlich wie bei vorigem, jedoch statt der verkehrt herzförmigen Makel an der Naht, jederseits in der Mitte, nahe der Naht mit einer queren Schuppenmakel........ striatus Waterh.

GRUPPE V.

a^1. Halsschild in der Basalhälfte, neben der medianen Schuppenlängslinie, jederseits noch innerhalb des Seitenrandes mit einer Längslinie, so dass im ganzen 3 vorhanden sind.

b^1. Flügeldecken auf dem Seitenrande mit einem Schuppenstreifen der sich bis in die Nähe der Naht auf dem Basalrand fortsetzt, um dann rechtwinkelig als Subsuturalstreifen nach hinten umzubiegen und an der Nahtspitze sich wieder mit dem Randstreifen zu vereinigen. Dieser Subsuturalstreifen wird in der Deckenmitte von einer beschuppten, zuweilen in Punkte aufgelösten Querlinie durchkreuzt.

c^1. Subsuturalschuppenstreifen an der Kreuzungsstelle mit der Schuppenquerlinie unterbrochen, ausserdem beiderseits an der Deckenbasis mit 2 kurzen Schuppenstreifen und in der Spitzenhälfte der Decken mit 2 beschuppten Tropfen........................ **cumingi** Waterh.

c^2. Subsuturalschuppenstreifen nur hinter der Schuppenquerlinie kurz unterbrochen, im 3. Viertel seiner Länge aussen mit einem nach vorn gekrümmten kurzen, an der Spitze verbreiterten Ast.
decussatus Waterh.

c^3. Subsuturalschuppenstreifen mit dem Querstreifen zusammenstossend und daselbst endigend, dafür zweigt von letzterem weiter nach aussen (ungefähr längs des 5. Deckenstreifens) eine andere Schuppenlinie rechtwinkelig ab, die sich vor der Deckenspitze mit dem Seitenrandstreifen vereinigt. Spitzenhälfte der Naht ebenfalls schmal beschuppt .... **phaleratus** Waterh.

b^2. Flügeldecken auf dem Seitenrande nicht, oder nur in geringer Ausdehnung beschuppt, an der Wurzel in geringer Entfernung von der Naht und in der Nähe der Schulter mit kurzem Schuppenstrichelchen. Deckenmitte mit einer Querreihe von Schuppenpunkten. Rüsselrücken vor dem Apicalwulst mit beschupptem Querstrich.
13. stellio sp. nov.

a^2. Halsschild in der Basalhälfte nur mit einem einfachen, mit dem Querstreifen meist T-artig zusammenstossenden, mittleren Schuppenlängsstreifen, oder dieser bis in die Nähe des Vorderrandes reichend und der Schuppenquerstreifen jederseits zu einem Punkt reduziert, oder das Halsschild überall zerstreut beschuppt.

d^1. Decken, ähnlich wie bei *P. cumingi* angegeben ist, mit Schuppenlinien geziert, doch ohne basale Längsstrichelchen und ohne Spitzenmakeln.

e^1. Naht beschuppt .... **chevrolati** Eyd. et Soul.[10]

e^2. Naht unbeschuppt.

f^1. Schuppenlängsstreifen vor und hinter dem Querstreifen unterbrochen .... **chevrolati** var. **chlorolineatus** Waterh.

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[10] Baer (*Bull. Soc. ent. France* (1888), CXCII, indentificiert wohl mit Recht *chevrolati* mit *chlorolineatus*, auch die Abbildung in der Voy. Bonite spricht dafür, doch wird im Widerspruch zu dieser Abbildung in beiden Beschreibungen [Rev. Zool. (1839) und Voy. Bonite (1841)] ausdrücklich erwähnt, dass die Naht beschuppt ist, was bei der gewöhnlichen Form von *chlorolineatus* nicht zutrifft.

f^2. Schuppenlängsstreifen nur hinter dem Querstreifen unterbrochen.

g^1. Schuppenstreifen aus gleich feinen Linien bestehend. chevrolati var. mandarinus Chevr.

g^2. Schuppen fast so breit wie die Schienen, blass grün, die in der Basalhälfte der Decken etwas keilförmig. chevrolati var. concinnus Waterh. und var. 14. jagori nov.[11]

d^2. Decken ohne ganze Schuppenlängsstreifen, höchstens mit kurzem Subsuturalstrichelchen und in der Mitte mit beschuppter Querlinie oder Quermakel, oder im Spitzendrittel mit Schuppenpunktschwarm, immer aber die unbeschuppte Fläche grösser oder höchstens so gross als die beschuppte.

h^1. Decken im Spitzendrittel mit türkisblauem Punktschwarm.

i^1. Halsschild überall zerstreut beschuppt .... rugicollis Waterh.

i^2. Halsschild mit in der Mitte sich kreuzender Längs- und Querschuppenlinie .... 15. rugicollis var. crucifer nov.

h^2. Decken im Spitzendrittel ohne Schuppenschwarm dafür aber mit kurzem Subsuturalstrichelchen an der Wurzel. Querstreifen des Halsschildes fein, in der Mitte häufig unterbrochen, zuweilen jederseits zu einem Punkt reduziert, dann die mittlere Längslinie weit nach vorn reichend.

k^1. Schuppenquerlinie an der Naht nicht oder sehr kurz unterbrochen, fein, aus einer einzigen Punktreihe gebildet........ monilifer Germ.

k^2. Schuppenquerlinie an der Naht breit unterbrochen, aus unregelmässig gehäuften weissen Schuppenpunkten bestehend und breit, zuweilen jederseits zu einer aus Schuppenpunkten gebildeten Makel reduziert .... 16. monilifer var. stellulifer nov.

k^3. Schuppenquerlinie an der Naht breit unterbrochen, bandartig, zuweilen in kurze parallele Längsstrichelchen aufgelöst, spangrün, Halsschildquerlinie immer ununterbrochen. gemmans Chevr.

h^3. Decken ohne Subsuturalstrichelchen an der Wurzel, dafür mit grosser, querer, oft bis an die Naht reichender Schuppenmakel, auch die mediane Querbinde auf den Decken und dem Halsschild breit, alle Schuppenbänder gewöhnlich rötlich, an den Rändern grün goldig .... gemmans var. ardens Chevr.

d^3. Decken grösstenteils beschuppt, die kahlen Stellen nehmen eine geringere Fläche als die beschuppten ein.

l^1. Decken rosafarbig beschuppt, mit einer rundlichen Kahlmakel an der Nahtwurzel und einer ungefähr T- oder V-förmigen in der hinteren Deckenhälfte .... jugifer Waterh.

l^2. Decken ebenfalls rosa beschuppt, vor und hinter der Mitte mit einer Querreihe von drei grossen Kahlmakeln, die alle blass grün gesäumt sind und von welchen die mittlere, beiden Decken gemeinsame, grösser als die seitliche ist............................ orbifer Waterh.

a^2. Halsschild in der Basalhälfte ohne beschuppte Mittellängslinie, dafür mit einfacher oder doppelter, oder in der Mitte zu einer rhombischen Schlinge erweiterten Querschuppenlinie, oder mit einem die Scheibe umschreibenden rhombisch verrundetem Schuppenring.

m^1. Die Deckenzeichnung besteht aus netzartig miteinander verbundenen Schuppenringen .... reticulatus Waterh.

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[11] Siehe dessen Beschreibung weiter unten.

m^2. Die Deckenzeichnung besteht aus grossen von einander gesonderten Schuppenringen .... 17. circulatus sp. nov.

a^4. Halsschild in der Mittellinie mit zwei fast parallelen, vom Vorder- bis der Wurzel jederseits mit 2 aussen und innen miteinander verbundenen, beschuppten Querlinien. Deckenmitte ebenfals mit 2, die Naht kreuzenden Querlinien, von denen die vordere sich auf die hintere Seitenrandhälfte fortsetzt und an der Spitze in Form einer stark S-förmigen Linie nach vorn umbiegt und mit dem äusseren Ende der zweiten Schuppenquerlinie sich verbindet .... speciosus Waterh.[12]

a^5. Halsschild nur mit einer an den Vorderhüften beginnenden, in der Mitte der Scheibe etwas verengten, breiten Querbinde. Decken mit breiter beschuppter Basal- und Medianbinde und jede im Spitzendrittel mit 3 Längsmakeln; erzgrün, Makeln matt blass grün.. latifasciatus Waterh.

GRUPPE VI.

a^1. Flügeldecken an der Wurzel mit 4 grossen, in der Mitte mit einer queren Makel, im ganzen mit 12 Makeln .... elegans Waterh.

a^2. Flügeldecken an der Wurzel nicht mit grösseren, sondern durchaus mit zahlreichen kleinen Punktmakeln.......... multipunctatus Waterh.

GRUPPE VII.

a^1. Halsschild am Vorder- und Hinterrande ringsum beschuppt.

  b^1. Schuppenringe der Decken je eine in der Mitte mehr oder weniger längs gewulstete Vertiefung umschreibend.......... annulatus Chevr.

  b^2. Schuppenringe keine Vertiefung umschreibend, die von ihnen umschriebene Kreisfläche liegt in einer Ebene mit der Deckenoberfläche .... 18. anellifer n. n.

a^2. Halsschild am Vorder- und Hinterrande nicht ringsum, sondern nur an den Seiten beschuppt, Decken mit 24 breiten Schuppenringen. argus Pasc.

INCERTAE SEDIS.

Als nomen nudum anzusehen ist.......... roseopictus Motsch, i. litt.

Wegen des dicht-runzelig punktierten Halsschildes wahrscheinlich in die Nähe von *Metapocyrtus erichsoni* gehörend, ist.......... waltoni Schönh.

1. Pachyrrhynchus ochroplagiatus sp. nov. (Taf. II, Fig. 11.)

Niger, nitidus, capite thoraceque haud maculatis, elytris maculis suturalibus nullis, maculis ochraceo-squamosis duodecim; singulis duabus maculis basalibus, una dorsali (oculo fere triplo majore) altera laterali, tribus postmedianis (duabus dorsalibus, mediana anteposita, laterali oblonga) et minuta in margine apicali; corpore subter glabro, abdomine subtiliter transverse strigoso.

Long. (capite haud computato) 17, lat. 7.7 mm.

Patria: LUZON, provincia Benguet, mons Pulog, legit *R. C. McGregor* (Bur. Sci. Acc. No. 11442).

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[12] Eines der mir bekannt gewordenen Exemplare trägt die Fundortangabe: Insel Samar (coll. A. Solari).

Glänzend schwarz, Kopf und Halsschild ohne Flügeldecken mit 12 ockergelb tomentierten Makeln, von welchen von oben nur jederseits 3 grosse, eine an der Basis und 2 hinter der Mitte, von welchen die äussere mehr nach vorn geschoben ist, und eine kleine punktförmige vor der Spitze sichtbar sind. Suturalmakeln fehlen.

Rüssel mit tiefem, auf dem Grunde rundlichen Eindruck. Stirn und Halsschild ohne Schuppenmakel, letzteres glänzend, kaum wahrnehmbar punktiert, so lang wie breit, nahe dem Vorderrand am breitesten, die Seiten ziemlich geradlinig, der Vorderrand etwas gewulstet, beiderseits hinter der Mitte, nahe am Seitenrande, mit einem Eindruck. Flügeldecken glänzend, ohne Punktreihen, die grosse elliptische basale Längsmakel näher dem Seitenrande als der Naht, mindestens doppelt so gross wie das Auge, die von oben nicht sichtbare, dicht an den Vorderecken liegende Seitenrandmakel etwas kleiner. Von den 4 in der hinteren Deckenhälfte gelegenen Makeln ist die im zweiten Drittel, von der Naht fast 1 Millimeter entfernte Makel, in Form und Grösse der Basalmakel gleich, die weiter vorn und mehr nach aussen gelegene dagegen rundlich, die am Seitenrande, wieder etwas nach hinten verschobene, schmal elliptisch, während die nahe dem Seitenrand, im 4. Deckenfünftel stehende klein und punktförmig ist. Unterseite glänzend schwarz, das letzte Bauchsegment und die Schenkel vor der Spitze längsstreifig.

2. **Pachyrrhynchus eques** sp. nov. (♀.)

Aeneus, prothorace utrinque supra coxas macula una, elytris ad basin maculis rotundatis quatuor ad apicem maculis decem et ad suturam, pone medium, macula communi minuta, cobaltino-squamosis; rostro subtilissime puntulato, dorso impresso, lateribus ante oculos haud sulcatis, antennis nigris; prothorace nitido latitudine longitudine aequali, globoso, vix punctulato; pedibus cupreo-aenescentibus, femoribus ante apicem, meso- et metasterno segmentisque duabus abdominalibus anterioribus lateribus, cobaltino-squamosis.

Long. 19, lat. 7.8 mm.

Patria: LUZON BOREALIS, ad flumen Abulog, legit *R. C. McGregor* (Bur. Sci. Acc. No. 11594).

Ganz erzfarben, mit schwachem, die Beine mit ausgesprochenem kupfrigen Schimmer. Fühler und Tarsen schwarz, letztere etwas kupfrig. Rüsseleindruck vorn unscharf begrenzt, Rüsselseiten vor den Augen ohne Längsfurche. Halsschild so lang wie breit, gewölbt, glänzend, oberseits ganz ohne Schuppenmakeln, nur über den Vorderhüften und auf diesen selbst mit kleiner Schuppenmakel. Flügeldecken eiförmig gewölbt, weder punktiert, noch mit Punktreihen, an der Wurzel jederseits mit 2 rundlichen Makeln von etwas über Augengrösse, im Spitzendrittel jederseits 5 kleinere Makeln und zwar 4 in je einer unordentlichen Querreihe vor der Spitze und eine an dieser selbst, sowie eine gemeinsame kleine Makel hinter der Nahtmitte, alle vergissmeinnichtblau beschuppt. Unterseite an den Seiten der Mittel- und Hinterbrust, sowie das 1. und 2. Bauchsegment und die Schenkel vor der Spitze ebenfalls hellblau beschuppt.

Analsegment (♀) in der Spitzenhälfte mit parallel zum Hinterrande verlaufenden Querfurchen.

3. **Pachyrrhynchus nobilis** sp. nov. (Taf. II, Fig. 9.)

Violaceo-cupreus, rostro maculis duabus, prothorace margine antico et postico lineolaque utrinque in dimidia parte basali, elytris in triente basali linea parabolica, per spatium secundum in spatio octavo recurvata, deinde linea mediana transversa, extra per spatium octavum ad apicem continuata et hic per spatium secundum antrorsum curvata, spatio quarto sextoque (interdum sexto solo) ante apicem lineola maculaque minuta ante femorum apicem, sulphureo- aut ochraceo-squamosis.

Long. 11–14, lat. 5–6.8 mm.

Patria: Insulae Philippinae, legit *Dr. C. Semper* (*patricius* Jekel i. litt.), Br. M., D. E. M., M. St., c. Sol., etc.

Purpurn, oder violet-kupfrig mit schwefel- oder blass ockergelben Schuppenlinien, Rüssel jederseits in den durch die Mittelfurche geteilten Dorsalgrübchen mit einer rundlichen, entlang des Augenunterrandes mit einer streifenartigen Schuppenmakel. Halsschild kugelig, etwas breiter als lang, unpunktiert, sein Vorder- und Hinterrand hell beschuppt und durch eine über den Vorderhüften verlaufende Längslinie mit einander verbunden, ausserdem innerhalb der Hinterecken jederseits mit einer bis zur Halsschildmitte nach vorn reichenden Schuppenlinie. Flügeldecken fein gereiht-punktiert, die Zwischenräume kaum wahrnehmbar punktiert, mit folgender Linienzeichnung: Eine mit dem Scheitel der Deckenwurzel zugekehrte parabolisch gebogene Linie, deren Aeste das erste Drittel des 2. und 8. Spatiums einnehmen, eine über die Naht gehende Querlinie, die aussen bis zur 8. Punktreihe reicht und daselbst auf dem 8. Zwischenraum nach hinten und nahe der Deckenspitze in gleichmässigen Bogen wieder nach vorn auf das 2. Spatium umbiegt und bis nahe der Deckenmitte nach vorn reicht, sowie je ein Strichelchen im dritten Viertel des 4. und 6. Spatiums, oder nur in letzterem allein, hell beschuppt. Epimeren der

Mittelbrust, die Seiten der Hinterbrust und alle Schenkel vor der Spitze mit kleiner Schuppenmakel.

4. **Pachyrrhynchus semperi** sp. nov. (♂, ♀.)

Aterrimus, nitidus, rostro lateribus ante oculos foveola oblonga; prothorace latitudine longiore, margine antico, postico lineolaque laterali in dimidia parte basili, marginem basalem haud attingente, rosaceo-squamosis; elytris ellipticis, tenuissime seriato-punctatis, summo apice rugosis, stria suturali apice foveolatim impressa, lineis auro-rosaceis ornatis, videlicet: una in dimidia parte basali spatii secundi et octavi, per marginem basalem conjunctis, altera, transversa, in elytrorum medio, per marginem lateralem postrorsum continuata et ad apicem per spatium secundum antrorsum curvata lineolaque in dimidia parte posteriore spatii sexti, plerumque cum linea transversa conjunta.

Long. 16–17, lat. 6–7 mm.

Patria: Insulae Philippinae, legit *Dr. C. Semper* (M. Berol., c. Sol. ex coll. *Mniszech.*).

Eine in der Anordnung der Schuppenlinien dem *P. nobilis* m. ähnliche, aber tief schwarze Art von gestreckter Körperform. Rüssel vor dem Auge mit länglichem Seiteneindruck, so dass die Seitenkanten wulstartig vortreten. Halsschild länger als breit, nach der Wurzel zu mehr als nach vorn verengt, äusserst fein zerstreut punktiert, auf dem Vorder- und Hinterrand beschuppt, die Beschuppung des Hinterrandes in der Gegend der Hinterecken durch eine Längsfalte kurz unterbrochen, innerhalb des Seitenrandes in der Basalhälfte mit einem Schuppenstrich, der die Basis nicht erreicht. Flügeldecken kaum wahrnehmbar gereiht punktiert, der erste Streifen an der Spitze eingedrückt, Ende des ersten Spatiums etwas wulstig, äusserste Deckenspitze fein gerunzelt, beim ♀ jede einzelne in eine kurze stumpfwinkelige, nach unten und etwas nach vorn gerichtete Spitze ausgezogen. Die rötlich goldige Schuppenzeichnung besteht aus je einer Längslinie im ersten Drittel des 1. und 7. Spatiums, die an der Wurzel gewöhnlich mit einander verbunden sind, einem Querstreifen in der Deckenmitte, der sich auf die hintere Hälfte des Seitenrandes bis nahe zur Spitze fortsetzt und auf dem 2. Spatium wieder nach vorn umbiegt und in einen Längsstreifen auf der hinteren Hälfte des 6. Spatiums, der vorn meist mit dem Querstreifen zusammenhängt, hinten aber immer abgekürzt ist. Ausserdem zeigen, wie gewöhnlich, die Seiten der Mittel- und Hinterbrust, sowie die des 1. und 2. Bauchsternites und die Schenkel vor der Spitze eine ebenso gefärbte Beschuppung. Analsegment des ♀ entlang des Seitenrandes eingedrückt.

6. **Pachyrrhynchus tristis** sp. nov. (♂, ♀.)

Ex P. pinorum Pasc. affinitate et eo statura simillima, sed elytris substriatis, haud sulcatis ac ut thorace maculis e squamulis caducis, inpigmentatis, instructis; videlicet: macula minuta oblonga prothoracali utrinque post medium, maculis duabus basalibus in elytris, una utrinque in spatio primo, altera in septimo et tribus anteapicalibus atque una apicali (rare etiam minuta anteapicali in sutura aut tribus antemedianis transverse dispositis); segmento abdominali ultimo in femina apice transverse-substrigoso.

Long. 15-18.5, lat. 6.3-8 mm.

Patria: LUZON, M. Dr., D. E. M., Br. M. (ex coll. *Bowring*), c. Sol., etc.

Die Art ist dem *P. pinorum* ausserordentlich nahe verwandt, so dass es schwer hält, ausser der Deckenskulptur und der Makelzeichung, noch andere Merkmale für diese überdies ziemlich veränderliche Art anzugeben.

Ziemlich glänzend schwarz, mit graulich erscheinenden, länglichen Makeln, die aus farblosen, runden Schüppchen, die in ihrem Zentrum ein Punktgrübchen, mit meist abgeriebener Borste zeigen, gebildet werden. Die gleiche, schon bei schwacher mikroskopischer Vergrösserung kenntliche Schüppchenbildung, die eine primitive Vorstufe zu den pigmentierten, ungenabelten Pachrrhynchiden- Schuppen darzustellen scheint, findet sich auch bei *pinorum, intermedius* und *glabratus* und ist somit ein weiteres Zeichen des genetischen Zusammenhanges dieser Arten.

Glänzend schwarz, Rüsseleindruck beiderseits mit einem selten erhaltenen, Wange unter dem Auge fast immer mit einem makelartigen Schüppchenschwarm,· Spitzenteil des Rüssels, wie bei *pinorum* ziemlich dicht, der Kopf sehr fein zerstreut punktiert. Halsschild viel länger als breit, beiderseits hinter der Mitte mit kleiner länglicher Schuppenmakel, zu der mitunter sich noch jederseits eine Quermakel an den Vorderecken und eine kleine Quermakel neben der Mittellinie am Basalrand hinzugesellen. Flügeldecken beim ♂ mehr oder weniger, beim· ♀ erloschen runzelig gestreift, die Zwischenräume leicht gewölbt, Spitze des ersten Deckenstreifens mit hinten sich verbreiterndem Eindruck, zweiter und vorletzter an der Spitze furchenartig mit einander verbunden, dieser in der Basalhäfte gereiht-punktiert, der äusserste Streifen wie bei *pinorum* scharf eingedrückt. Die Deckenbeschuppung besteht aus wenigstens zwei länglichen Makeln an der Wurzel, eine auf dem ersten die andere auf dem 7. Spatium und 3 vor der Spitze, nahe am Ende des 2., 4. und 6. Spatiums;

häufig kommen zu diesen noch weitere Makeln hinzu, so fast immer noch eine kleine direkte an der Spitze des zweiten Spatiums und eine mit den 3 anderen eine Querreihe bildende vor der Spitze auf dem 8. Spatium, selten auch noch eine punktartige hinter der Mitte und vor der Spitze der Naht und in einem Falle sogar noch eine Querreihe von 3 Makeln vor der Deckenmitte, auf dem 2., 4. und 6. Spatium. Unterseite glänzend schwarz, Seiten der Hinterbrust und die Schenkel unterseits vor der Spitze sehr selten mit deutlicher kleiner Schuppenmakel, alles übrige wie bei *P. pinorum* Pasc.

7. **Pachyrrhynchus lacunosus** sp. nov.

Species inter P. pinorum et tristis intermedia; niger nitidus; rostro utrinque in impressione dorsali, prothorace in margine antico, ad angulos posticos, in margine basali, prope medium et ad marginem lateralem post medium, maculis minutis hyalino-squamosis; elytris impressionibus vitti- et maculiformibus hyalino-squamosis, videlicet: vitta marginali spatium penultimum fere totum replente, interdum ante basin et regulare ante apicem interrupta, duabus vittis loco spatti secundi, anteriore, longiore, a basi usque ad medium extensa, posteriore breviore alteris duabus, interdum connexis, loco spatii quarti anteriore a basi distante, dein duabus loco spatii sexti, anteriore basi approximata et duabus maculis oblongis, minutis, suturalibus una post medium, altera ad apicem.

Long. 17–18, lat. 7–7.2 mm.

Patria: Insulae Philippinae, Br. M. (ex coll. *Bowring*), M. Berol., D. E. M.

Schwarz, glänzend, zwischen *pinorum* Pasc. und *tristis* m. stehend, mit breiten graulich beschuppten, leicht eingedrückten Längsbändern und Makeln. Rüssel im Spitzenteil mässig dicht und fein punktiert. Stirneindruck mit länglichem vertieftem Schuppenschwarm in der Mitte mit glattem Längsfeld, Stirn beim ♂ nicht, beim ♀ äusserst fein punktiert. Halsschild länger als breit, grösste Breite vor der Mitte, sehr fein zerstreut punktiert, beiderseits an den Vorderecken mit grosser Quermakel, hinter der Mitte innerhalb des Seitenrandes, mit kleiner Längsmakel und an der Basis beiderseits der Mittellinie mit kleiner rundlicher oder querer Makel, alle Makeln von durchsichtigen, farblosen Schüppchen gebildet. Flügeldecken nur hie und da mit Spuren von Punktreihen, in der Mitte und an der Spitze der Naht jederseits mit vertiefter, länglicher Schuppenmakel, die ungefähr so lang als der Rüssel breit ist, ferner das 2. Spatium von der Wurzel bis zur Mitte und hinter dieser eine ungefähr dreimal so lange wie breite Längsmakel, das 4. Spatium vom 2. Fünftel seiner Länge ab bis zur Mitte und eine Makel vor der Spitze, das vorletzte Spatium der ganzen Länge nach, oder in der Mitte mit Unterbrechung und endlich eine dreieckige Makel an der Vereinigung des ersten und vorletzten Spatiums vertieft und wie die Halsschildmakeln beschuppt, äusserster Deckenstreifen an seinem Ende tief eingedrückt, die Deckenspitze nicht erreichend, Spitze des ersten Spatiums wulstig vortretend. Auf der Unterseite sind ein Längsstreifen über den Vorderhüften, eine Makel unter dem Auge, auf den Vorderhüften an den Seiten der Mittel- und Hinterbrust, so wie unterseits vor der Spitze der Schenkel beschuppt.

8. **Pachyrrhynchus psittacinus** sp. nov. ♂ (Taf. I, Fig. 16.)

Aterrimus, nitidus, elytris maxima parte aeruginoso-squamosis, vitta lata suturali, duabus maculis squamosis exceptis, fasciaque transversa mediana, marginem lateralem haud attingente, nigroglabris; rostro impressione dorsali, triangulari, aeruginoso-squamosa, lateribus ante oculos impressione sulciforme; prothorace latitudine longiore, vitta lata supracoxali maculaque transversa utrinque ad angulos anticos et puncto minuto submarginali utrinque pone medium, aeruginoso-squamosis; elytris pone suturam impressione apicali oblonga; corpore subter vitta supra coxas anticas lateribusque meso- et metasterni maculisque utrinque in segmentibus duabus anterioribus abdominalibus, ut femoribus ante apicem, aeruginoso-squamosis.

Long. 15.2, lat. 6 mm.

Patria: LUZON, provincia Bataan, Lamao, legit *H. M. Cuzner* (Bur. Sci. Acc. No. 7008).

Eine langgestreckte Art von Gestalt des *P. pinorum* Pasc. aber glänzend schwarz, die Flügeldecken mit Ausnahme eines von einem kahlen, breiten Nahtstreifen und einer kahlen Querbinde gebildeten kreuzähnlichen, schwarzen Zeichnung, matt spangrün beschuppt. Rüssel auf dem dreieckigen Dorsaleindruck und unter dem Auge mit einer Schuppenmakel, die Seiten der Rüsselspitze mit zerstreuten Schüppchen von spangrüner Farbe. Halsschild länger als breit, grösste Breite vor der Mitte, oberseits äusserst fein zerstreut punktiert, eine quere Schuppenmakel an seinen Vorderecken und ein kleines Pünktchen hinter der Mitte innerhalb des Seitenrandes, ebenfalls hellgrün beschuppt. Flügeldecken auf dem breiten kahlen Suturalstreifen sowohl hinter der Mitte der Naht als auch an der Spitze mit länglicher hellgrüner Doppelmakel, in der Mitte mit breiter, kahler, nach vorn und hinten kurze Längsstreifen aussendender Querbinde, im übrigen fast ganz matt spangrün beschuppt. Diese zerstreut schwarz punktierte grüne Beschuppung ist, wie die feinen kahlen Längsstreifen erkennen lassen, aus dem Zusammenfliessen einer streifen- und makelartigen Beschuppung hervorgegangen und zwar lassen sich im vorderen Deckendrittel 4 verschmolzene Längsstreifen, im Spitzendrittel 5 verschmolzene Längsmakeln vermuten.

9. **Pachyrrhynchus morio** sp. nov. (♂, ♀.)

Aterrimus, capite prothoraceque nitidis, elytris opacis, prothorace maculis tribus, una oblonga mediana ad basim et utrinque una ad angulos anticos e squamulis caducis, hyalinis; elytris subtilissime alutaceis, solum striis duabus exterioribus instructis, penultima seriato-punctata, ultima sulcata, apice profundiore, basi et ante apicem maculis, oculi magnitudine, utrinque duabus atque macula apicali, hyalino-squamosis; corpore subter subtiliter remoteque punctato, segmento primo subtiliter transverso-aciculato.

Long. 7.5-15, lat. 5-6.5 mm.

Patria: LUZON, (M. Dr. ex coll. *Faust*).

Eine ganz schwarze, durch die matten, äusserst fein lederartig gerunzelten Decken und den glänzenden Kopf und Halsschild kenntliche Art, mit gräulichen unscheinbaren Schuppenmakeln und am besten wohl in die Nähe von *immarginatus* Kraatz zu stellen. Halsschild äusserst fein punktiert, länger als breit, grösste Breite vor der Mitte, beiderseits in den Vorderecken und in der Mitte mit einer Basalmakel. Flügeldecken nur mit 2 äusseren Deckenstreifen, von denen der vorletzte gereiht-punktiert, der letzte tief gefurcht und nach der Spitze zu etwas verbreitert und auf dem Grunde fein gereiht-punktiert ist; an der Deckenwurzel jederseits 2, an der Deckenspitze mit 3 Schuppenmakeln, von Augengrösse, von denen eine jederseits an der Stelle an der man sich den Vereinigungswinkel des 2. und vorletzten Streifens zu denken hat, liegt, die anderen eine gerade Querreihe von 4 Makeln im 2. Deckendrittel bilden. Unterseite über den Vorderhüften in Form eines breiten Längsstreifens, die Seiten der Mittel- und Hinterbrust, so wie der ersten 3 Bauchsegmente unscheinbar makelartig beschuppt. Erstes Bauchsegment fein quer nadelrissig mit zerstreuten Punkten.

10. **Pachyrrhynchus viridans** sp. nov. (♀.)

P. smaragdino Behrens magnitudine aequali, niger subopacus, maculis pallide viridibus similiter ut in P. coerulans Kraatz dispositis, ornatus; prothorace latitudine perpaulo longiore, maxima latitudine ante medium, sat globoso, in angulis anticis utrinque macula subquadrata, basi in medio macula vittiforme; elytris maculis viginti, oculi fere magnitudine, chloro-squamosis, macula suturali-apicali apice remotius quam in P. coerulans Kr.

Long. 17, lat. 8 mm.

Patria: CALAYAN, legit *R. C. McGregor* (Bur. Sci. Acc. No. 705).

Eine grosse an *P. smaragdinus* Behrens erinnernde matt schwarze Art, aber die blass grünen Schuppenmakeln ganz ähnlich wie bei *P. coerulans* Kraatz angeordnet. Fühlergeissel auffallend kurz und gedrungen, die beiden letzten Glieder deutlich quer. Vorderrand des dorsalen Rüsseleindruckes dem Vorderrand des Rüssels näher als dessen Mitte. Rüsselseiten mit kurzem Längseindruck. Halsschild sehr wenig länger als breit, ziemlich kugelig gewölbt, nach der Basis zu stärker als nach vorn verengt, an den Vorderecken mit einer quer viereckigen, in der Mitte des Basalrandes mit einer länglichen Schuppenmakel. Flügeldecken 1½ mal so lang wie breit (11.5 × 7.8 Millimeter), äusert fein lederartig gerunzelt, daher matt, jederseits mit 2 die Augen an Grösse übertreffenden elliptischen Basalmakeln, dahinter mit einer Querreihe von 4 rundlichen Makeln, deren 2. etwas nach hinten, die 3. etwas nach vorn, die 4. randständige, streifenartige, wieder nach hinten verschoben ist, 3., ante-apicale Querreihe mit 3 runden Makeln, deren mittlere nach vorn gerückt ist, Apicalmakel undeutlich dreieckig. Neben einer Doppelmakel in der Mitte der Naht findet sich eine 2. kleinere Suturalmakel vor der Deckenspitze, diese ist aber so weit von letzerer entfernt, dass sie bei der Ansicht der Decken von oben (wie bei *chlorites*) etwas vor der Apicalmakel gelegen ist. Vorderbrust über den Vorderhüften mit breitem Längsstreifen, Mittel- und Hinterbrust, sowie die ersten zwei Bauchsternite an den Seiten, die Schenkel vor der Spitze blass grün beschuppt.

12. **Pachyrrhynchus sanchezi** sp. nov. (♂, Taf. II, Fig. 10.)

Aterrimus, nitidus, plagis permagnis, rotundatis, fulgente prasino-squamosis; rostro subtilissime punctato, dorso parte apicali concavo, in impressione et in fronte macula squamosa, subrotundata; prothorace latitudine longiore, maxima latitudine ante medium, supra plagis tribus, oculo plus duplo majoribus, una subtrigona mediana ad basin, altera rotundata utrinque pone angulos anticos; elytris plagis XVI prasino-squamosis, duabus autem postmedianis suturalibus communis, quatuor in seria longitudinali discali, macula ultima, apicali, ad suturae apicem versus caudatim arcuato-producta et tribus lateralibus, una infrahumerali, ovata, maxima, altera marginali post mediana, oblonga, tertia, minore, mediana, interiore; corpore subter glabro, prosterno vitta longitudinali, lata, supracoxali, meso- et metasterni ut segmentorum abdominalium 1°–3°, lateribus maculaque femorali, anteapicali, prasino-squamosis.

Long. 11, lat. 6.2 mm.

Patria: LUZON, provincia Benguet, Baguio, legit *F. Sanchez* S. J. (Bur. Sci. Acc. No. 13304).

Eine prächtige, glänzend schwarze, durch die sehr brillant hellgrün beschuppten, grossen Makeln ausgezeichnete Art, die zufolge der Gruppirung letzterer in die Verwandtschaft von *P. scarcitis* Behrens gehört. Rüssel sehr fein und zerstreut punktiert, der Spitzenteil leicht concav, der Dorsaleindruck vorn gerade abgestutzt mit rundlicher Schuppenmakel, die durch eine haarfeine glatte Medianlinie geteilt wird, Stirn und die Rüsselseiten vor und hinter der Fühlergrube ebenfalls grün beschuppt. Halsschild länger als breit, seine grösste Breite vor der Mitte, kaum wahrnehmbar punktiert, in der Mitte an der Basis mit einer grossen dreieckigen, nahe den Vorderecken je mit einer rundlichen Schuppenmakel von doppelter Augengrösse. Decken gestreckt elliptisch, mit 16 grossen Schuppenmakeln, von denen 2 gemeinsam sind und in der hinteren Hälfte auf der Naht stehen, die übrigen eine von der Wurzel bis zur Spitze laufende Längsreihe von 4 Makeln, deren hinterste mit einem spitzenständigen kurzen Randstreifen kammartig zusammenfliesst und eine Seitenreihe von 3 Makeln bilden, von welchen die vorderste, ovale, die grösste, die folgende randständige, hinter der Deckenmitte, gestreckt und die vor ihr und weiter innen liegende die kleinste aller Makeln (wenig grösser als das Auge) ist. Die grüne Beschuppung der Unterseite besteht aus einem breiten Längsstreifen über den Vorderhüften und Makeln an den Seiten der Mittel- und Hinterbrust, sowie an den Seiten der 4 vorderen Bauchsternite, von denen aber nur die 2 ersten Paare von Augengrösse, die übrigen 2 Paare unscheinbar sind und je einer Längsmakel auf der Unterseite vor jeder Schenkelspitze.

13. **Pachyrrhynchus stellio** sp. nov.

Niger, statura elongata, fere ut in congesto Pasc. et elytris ut in monilifero signatis; rostro dorso fere plano ante partem apicalem punctulatum, linea transversa atque macula infra oculos, altera infra antennarum insertionem, viridi-squamosis; prothorace latitudine longiore, subnitido, maxima latitudine ante medium, linea transversa lineam medianam ad marginem posticum ac utrinque ramum ad angulos anticos et posticos exmittente, pallide malachitico-squamosis; elytris subtilissime alutaceis, haud seriato-punctatis, lineola utrinque subsuturali et subhumerali abbreviatis, linea marginali postmediana, ut linea transversa mediana, maculatim dissolutis, hic ad suturam interrupta, maculisque anteapicalibus in femoribus pallide malachitico-squamosis.

Long. 14.5, lat. 6 mm.

Patria: LUZON, provincia Bataan, Lamao, legit *H. E. Stevens* (Bur. Sci. Acc. No. 9832).

Diese Art könnte man leicht geneigt sein für eine sehr grosse schlanke Varietät von *P. monilifer* Germ. zu halten, da die Decken genau so wie bei dieser Art gezeichnet sind, die abweichende Rüsselbildung, Halsschildform und dessen Beschuppung, welche die Art mit *phaleratus* Waterh. gemein hat, sowie die nicht gereiht-punktierten Decken weisen unzweifelhaft auf eine besondere Art hin. Rüsselrücken kaum merklich eingedrückt, der angeschwollene Spitzenteil fein punktiert, am Hinterrande ausgebuchtet und dahinter mit einer queren grünlichen Schuppenlinie, eine gleichfarbige Schuppenmakel findet sich unter dem Auge und unterhalb der Fühlerinsertion. Halsschild länger als breit, ziemlich glänzend blauschwarz, kaum wahrnehmbar fein und zerstreut punktiert, seine grösste Breite vor der Mitte, in der Mitte mit einer Schuppenquerlinie, die in der Mitte eine Linie nach dem Halsschildhinterrand und beiderseits je eine nach den Vorder- und Hinterecken ziehende Linie, die durch eine Längslinie über den Vorderhüften zu einer Ellipse geschlossen wird, entsendet. Flügeldecken matt, äusserst fein lederartig gerunzelt, ohne Punktreihen ganz ähnlich wie *P. monilifer* mit einem kurzen Subsutural- und Subhumeralstrichelchen und einer punktartig aufgelösten Marginallinie in der hinteren Deckenhälfte und eben solcher Querlinie in der Deckenmitte, sämmtliche aus blassgrünen Schüppchen, geziert. Im 2. Drittel der Deckenlänge findet sich jederseits in der Mitte ein winziges Pünktchen, an den Seiten der Mittel- und Hinterbrust, sowie auf denen des ersten und 2. Bauchsegmentes und vor der Spitze der Schenkel eine Makel von grünlichen Schüppchen.

14. **Pachyrrhynchus chevrolati** var. **jagori** nov.

P. chevrolati var. concinno affinis, sed prothorace vitta medianobasali, postice triangulariter dilatata; elytris vitta dorsali haud interrupta et spatio quarto sextoque ante apicem lineolis squamosis.

Patria: SAMAR, legit *F. Jagor* (M. Berol. N. 39267).

Diese auffallende Varietät des *P. chevrolati* Eyd. et Soul. zeichnet sich sowie die var. *concinnus* durch breite Streifenzeichnung aus, die bei dem einzigen mir vorliegendem Stück mehr gelblich silbern, statt grünlich ist. Die Basalmakel in der Mitte des Thorax ist von spitz dreieckiger Form, der dorsale Schuppenstreifen ist weder vor, noch hinter der Querbinde unterbrochen und das von ihm eingeschlossene schwarze Apicalfeld zeigt vor der Spitze des 4. und 6. Spatiums je einen Schuppenstrich von ungefähr Fühlerschaftlänge.

16. **Pachyrrhynchus monilifer** var. **stellulifer** nov.

P. monilifero simillimus, sed squamolis loco glaucarum, albidis ac fasciatim aut maculatim acervatis, rostro in parte apicali prothoraceque fortius punctatis hic signatura discali T-forme, interdum interrupta albo-squamosa, squamulis punctatim congestis; elytris remote, sat distincte seriato-punctatis, basi lineolisque plerumque duabus basalibus, fascia mediana ad suturam late interrupta et per marginem lateralem plus minusve cum linea apicali, subsuturali conjuncta punctatim albo-squamosis; femoribus in dimidia parte basali ac ante apicem parce albo-squamosis.

Long. 9-12, lat. 3.8-6 mm.

Patria: Insulae Philippinae (M. Dr. ex coll. *Faust*).

Diese Form steht dem *monilifer* so nahe, dass sie trotz anscheinend konstanter geringer Skulptureigentümlichkeiten die in Korrelation mit der mässigeren weissen Beschuppung zu stehen scheinen, kaum als eigene Art anzusprechen ist. Der Unterschied in der Skulptur kommt namentlich in dem stärker punktierten Apicalteil des Rüssels, den deutlicheren Punktreihen der Decken und deutlicheren Chagrienierung namentlich der Schienen zum Ausdruck. Das augenfälligste Merkmal dieser Form ist aber die Beschuppung die statt bläulich, oder grünlich, gelblich-weiss und viel ausgebreiteter ist. Während bei dem typischen *monilifer* die Schuppenzeichnung, aus feinen bläulich grünen Linien und Punkten besteht, wird sie bei *stellulifer* aus ziemlich grossen Schuppenpunkten, die zu relativ breiten Bändern zusammen gedrängt sind, gebildet. Namentlich das Querband in der Deckenmitte, das niemals die Naht durchkreuzt, ist, wenn auch zuweilen in Punkte aufgelöst und zerissen, doch immer mindestens von Hinterschenkelbreite.

17. **Pachyrrhynchus circulatus** sp. nov. (Taf. I, Fig. 12.)

P. reticulato affinis, sed lineis chlorosquamosis in circulis dissolutis; fronte linea elliptica, prothorace disco linea rhomboidali, interdum lineam lateralem, ovalem, tangente elytrisque circulis sat magnis decem chlorosquamosis ornatis, duobus utrinque basalibus se tangentibus, duobus medianis disjunctis quorum externo per lineam marginalem cum circulo apicali, majore conjuncto, femoribus in parte mediano subrufescentibus.

Long. 12–13, lat. 6 mm.

Patria: CATANDUANES ORIENTALES, legit *J. Whitehead*, Br. M. et M. Dr. (ex. coll. *Fry*).

Die Art steht trotz der unähnlichen Zeichnung dem *reticulatus* Waterh. so nahe, dass sie vielleicht besser als Subspecies von diesem aufgeführt werden könnte; ich sehe aber vorläufig davon ab dies zu tun, weil wenn die Zusammengehörigkeit beider Formen von anderer Seite nicht erkannt die neue Form unter *reticulatus* Subspecies nicht vermutet wird und so leicht nochmals beschrieben werden kann. Ausserdem scheint es sich um eine recht ausgeprägte konstante insulare Form zu handeln, von der mir 2 gleiche Stücke vorliegen; *P. reticulatus* hat mir aus verschiedenen Sammlungen in einer ziemlichen Reihe von Stücken vorgelegen, die aber sehr wenig Neigung zur Abänderung zeigten.

P. circulatus scheint eine Vorstufe von *reticulatus* zu sein, denn denkt man sich die grünlichen Schuppenringe des ersteren derartig vergrössert, dass sie sich untereinander berühren, so kommt die netzartige Zeichnung des letzteren zustande. Rüssel mässig dicht und sehr fein punktiert, der breite Dorsaleindruck ohne deutliche Mittelfurche, Stirn mit elliptischer grünlich beschuppter Linie von über Augengrösse, die vorn die Basalquerfurche teilweise bedeckt, nahe zu den Augeninnenrand tangiert und etwas über das Auge hinaus nach hinten (oben) reicht. Halsschild so lang wie breit, Scheibe in der Mittellinie leicht eingedrückt, der Eindruck die Diagonale eine ungefähr rhombische oder verkehrt birnförmige Schuppenlinie bildend. Eine ähnliche, aber bis auf den Vorderrand übergreifende ovale, oder etwas rhombische Schuppenlinie befindet sich beiderseits an den Halsschildseiten, sie tangiert den Vorderhüftenrand und ist zur Hälfte von oben sichtbar, bei einem der beiden Stücke hängt sie mit der dorsalen Schuppenlinie zusammen, bei der anderen ist sie von dieser deutlich getrennt. Flügeldecken regelmässig und fein gereiht-punktiert, jederseits an der Basis mit 2 einander berührenden, hinter der Mitte mit 2 von einander gesonderten und an der Spitze mit einer etwas grösseren annähernd kreisförmigen grünlichen Schuppenlinie. Letztere, die an Grösse dem Umfange des Kopfes, ohne Rüssel, nahekommt ist längs des Seitenrandes mit der äusseren der beiden mittleren Ringe verbunden, so dass eine brillenähnliche Zeichnung entsteht. Schenkel in der Mitte etwas rötlich, vor der Spitze mit Schuppenmakel. Unterseite schwarz, die Vorderbrust in der Mitte, am Vorder-

und Hinterrand, die Mittel- und Hinterbrust grösstenteils, das 1. Bauchsegment beiderseits das 2. und letzte der ganzen Breite nach grünlich beschuppt.

18. **Pachyrrhynchus anellifer** n. n. für **annulatus** Behrens.

Chevrolat hat im Naturalist, 1881, einen *P. annulatus* beschrieben, der mir wie ich annehme in 2 Examplaren aus Luzon, Provinz Benguet, vom Berge Pulog (Bur. Sci. Acc. No. 11451), vorliegt. Unter dem gleichen Artnamen hat auch W. Behrens[13] einen *Pachyrrhynchus* beschrieben, der aber einer anderen Art angehört. Beide Arten sind einander ähnlich und verwandt. *P. anellifer* (n. nom. für *annulatus* Behrens) unterscheidet sich aber von *annulatus* Chevr. dadurch, dass die Schuppenringelchen der Decken weniger zahlreich, mehr rund, nach dem Mittelpunkte zu scharf abgegrenzt und ihre innere Fläche weder eingedrückt, noch Spuren eines Längswulstes zeigen, ferner dadurch, dass von den viel kleineren an der Naht stehenden Ringelchen nur 2–3 statt 4 Paare, wie sie *P. annulatus* Chevr. zeigt, vorhanden sind. Letztere Art zeigt fast alle Schuppenringelchen in die Länge gezogen und die von ihnen umgrenzte Fläche am Rande mit grösseren, innen mit sehr kleinen Schüppchen bedeckt, so dass man eben so gut von an den Rändern dichter beschuppten, flachen Eindrücken, von denen die vorderen in ihrer Mitte eine schwache Längsleiste zeigen, sprechen könnte, ausserdem weist diese Art auch zwischen den Augen ein Paar Schuppenmakeln auf, die *anellifer* fehlen und ihre Hinterschenkel überragen deutlich die Deckenspitze.

P. anellifer liegt mir in Stücken aus Luzon, Provinz Benguet, vom Irisan Fluss (Bur. Sci. Acc. No. 1255) vor, die von Herrn R. C. McGregor gesammelt sind.

Genus **EUPACHYRRHYNCHUS** nov.

Pachyrrhynchidarum prope *Pachyrrhynchus* Germ.

Rostrum ut in genere Pachyrrhynchus dorso parte apicali tumida. Antennae scapo marginem posticum oculi attingenti. Elytra breviter ovata, lateribus ampliatis, dorso depresso.

Die Gattung steht zwischen *Pachyrrhynchus* und den *Apocyrtus* ähnlichen Gattungen, der Körperform nach erinnert sie etwas an *Metapocyrtus albodecoratus* m. Rüssel ganz wie bei *Pachyrrhynchus,* mit an den Seiten rechtwinkelig abfallenden Seiten und concavem Rücken. Fühler dagegen mit verlängertem den Augenhinterrand erreichendem Schaft. Halsschild nur an den

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[13] *Ent. Zeitg.* Stett. (1887), 256.

Seiten mit feiner Vorderrandfurche, Vorderrand der Vorderbrust deutlich ausgebuchtet. Kurz oval, bauchig, 1½ mal so breit wie hoch, flach gedrückt, hinten steil abfallend, besonders beim ♀, die Spitze etwas vorgezogen. Mittelbrust zwischen den Mittelhüften etwas quer, trapezoidal. Erstes und zweites Abdominalsternit miteinander verschmolzen.

19. **Eupachyrrhynchus superbus** sp. nov. (Taf. II, Fig. 8.)

Atro-purpureus, elytris breviter ovatis depressiusculis, maculis magnis rutilo-cinctis ac viridisquamosis; antennis scapo oculi marginem posticum attingente; thorace maxima latutudine ante medium, maculis quatuor ornatis, una transversa utrinque in angulis anticis et cum macula supra-coxali conjuncta, altera oblonga pone angulos posticos; elytris seriato-punctatis, plagis circiter XIV viridi-squamosis et cum margine, late aurato-squamoso plus minusve confluentibus; corpore subter glabro, feminae segmento anali pone marginem sulcato-impresso.

Long. 13.5-15, lat. 7-7.2 mm.

Patria: Insulae Philippinae, legit *Dr. C. Semper*, M. St., M. Dr., D. E. M., et c. Sol.

Schwärzlich purpurn, mit hellgrünen, goldigrot umrandeten Schuppenmakeln. Rüssel in seinem concaven Rückenteil mit länglicher goldig beschuppter Makel. Stirn zwischen den Augen fein und zerstreut punktiert, in der Mitte mit grösserem, eingestochenem Punkt, Scheitel glatt. Halsschild kaum merklich breiter als lang, äusserst fein zerstreut punktiert, seine grösste Breite vor der Mitte, in den Vorderecken mit einer goldigen Schuppenquermakel, die mit einer gleichen Beschuppung an den Halsschildseiten, über den Vorderhüften meist verbunden ist; in den Halsschildhinterecken eine mit der Spitze nach hinten gerichtete keilförmige Makel, von halber Halsschildlänge. Flügeldecken kurz eiförmig, flachgedrückt, beim Männchen hinten steil abfallend, beim Weibchen die Spitze etwas vorgezogen, in der vorderen Hälfte regelmässig gereiht-punktiert, in der hinteren Hälfte verworren punktiert. Die beschuppten Stellen der Decken übertreffen die kahlen an Flächeninhalt und bestehen aus einem breiten, in der vorderen Hälfte zuweilen unterbrochenen, im Spitzenteil stark verbreiterten, goldigen Seitenrand und aus folgenden hellgrün und gluhtrot umrandeten Makeln: Je 2 ovale zuweilen zusammenhängende Längsmakeln[14] neben der Naht, die bis zur Deckenmitte nach hinten reichen, ferner

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[14] Hängen diese Makeln zusammen, so entsteht, eine Zeichnung von ungefähr löffelartiger Form, die Behrens veranlasste die Art *P. cochleariger* in litt. zu benennen.

aus je einer grossen vom Seitenrande bis nahe an die 4. Punktreihe heranreichende Quermakel von ungefähr halber Halsschildgrösse, über den Hinterhüften, aus einer gemeinsamen strichförmigen im Spitzendrittel der Naht und aus je 4 kleineren rundlichen in der Apikalhälfte der Decken. Unterseite, sowie die Beine glänzend schwarz, die Schenkel etwas grünlich oder purpurn irisierend. Seiten der Vorder-, Mittel- und Hinterbrust goldig beschuppt. Letztes Bauchsegment des Weibchens rings entlang des freien Randes mit tiefer Furche.

Genus **PSEUDAPOCYRTUS** nov.

Pachyrrhynchidarum prope *Apocyrtus* Er.

Rostrum latitudine paulo longius, convexum a fronte haud distinctum, dorso haud impresso. Scrobes margine superiore carinato. Antennarum scapus margine postico oculari superans. Oculi modice convexi. Prothorax basi truncatus. Elytra convexa, interdum fere inflata, episterna metathoracalia angustissima obtegentia. Sternitum abdominale primum secundo connatum, tertium quartumque in femina haud aspectabilia.

Typus der Gattung ist: *P. imitator* sp. nov. Ferner gehören noch hierher: *schadenbergi* sp. nov., *formicarius* sp. nov., *exsectus* sp. nov., und *productus* sp. nov.

Bestimmungstabelle der Pseudapocyrtus-Arten.

a^1. Flügeldecken schwarz mit hellen Ringelchen, von ungefähr Augengrösse, die von goldigen oder grünlichen Schüppchen gebildet werden. 20. schadenbergi sp. nov.

a^2. Flügeldecken ohne Ringelzeichnung.

- b^1. Halsschild kugelig.
    - c^1. Decken grünlich schwarz, ohne Schuppenmakeln, Oberseite des Halsschildes und die Beine, mit Ausnahme der schwarzen Schenkelspitzen, rot .... 21. formicarius sp. nov.
    - c^2. Decken rotbraun mit grüner Apicalmakel, ihr Seitenrand vor der Spitze tief (fast halbkreisförmig) ausgeschnitten, Halsschildmittellinie und eine Stirnmakel grün beschuppt. 22. exsectus sp. nov.
- b^2. Halsschild länger als breit, gestreckt tonnenförmig, Apicalteil der Decken stark vorgezogen.
    - d^1. Der erste und zweite Deckenstreifen, neben der Naht, regelmässig, die streifenartigen Zwischenräume, namentlich der zweite sowie die Naht in der Spitzenhälfte etwas rippenartig vortretend und mindestens so breit wie die Punktreihen. 23. imitator sp. nov.
    - d^2. Alle Deckenstreifen grob narbig punktiert und verworren, die Punkte grösser als die Zwischenräume und diese hie und da querrunzelig zusammenfliessend........ 24. productus sp. nov.

20. **Pseudapocyrtus schadenbergi** sp. nov. (Taf. II, Fig. 3.)

Niger, nitidus, inflato Er. paulo minor; prothorace, globoso, despumato-granuloso, margine basali laevigato, lateribus squamulis paucis; elytris seriato-punctatis, annulis (oculo aeque magnis) circiter 26, e squamulis viridibus formatis, quatuor utrinque subconjunctis ad basin, tres, transverse ordinatis, in dimidia parte, sex in parte apicali; corpore subter parce subtiliterque piloso, pro-, meso- et metasterno lateribus parce viridisquamosis; abdomine segmentis quinque, primo secundoque connatis.

Long. (rostro haud computato) 10, lat. 5 mm.

Patria: LUZON, legit *Dr. A. Schadenberg,* M. Dr. No. 6332.

Körperform ähnlich der von *A. inflatus* Er. aber etwas kleiner, schwarz, namentlich der Rüssel und die Beine glänzend. Rüssel ganz ohne Basalquernaht, fein zerstreut punktiert, Stirn zwischen den Augen mit feiner, vorn etwas verbreiteter Mittellinie, fein und zerstreut, der Scheitel nicht punktiert. Fühler schwarz, 1. und 2. Geisselglied verlängert und gleich lang, die folgenden perlschnurförmig, das 3. und 4. Geisselglied zusammengenommen kürzer als das 2., Halsschild kugelig, etwas breiter als lang, ganz abgeschliffen gekörnelt, die Körner ungefähr so gross wie das letzte Geisselglied, mit 1–2 eingestochenen Punkten, Basalrand geglättet, an den Seiten mit undeutlich ringförmig angeordneten grünen Schüppchen. Flügeldecken eiförmig gewölbt, mit etwas vorgezogenem Spitzenteil, kräftig gereiht-punktiert, die Punktreihen vom 3. Streifen ab verworren, nur die äussersten 2 wieder deutlich und etwas eingedrückt. Deckenwurzel mit 4 grünen Schuppenringen, von ungefähr Augengrösse, von denen 2 dicht an der Basis, der 2. und 4. (von der Naht ab) etwas mehr nach hinten verschoben ist, drei ähnliche Schuppenringe, von denen der mittlere jedoch kleiner ist, bilden in der Deckenmitte eine Querreihe und 6 weitere Ringelchen, die sich zum Teil tangieren, füllen das Spitzendrittel aus. Unterseite fein und sehr sparsam behaart, der Hinterleib mit 5 sichtbaren Bauchschienen von denen die 1. mit der 2. in der Mitte verschmolzen ist, Seiten der Vorder-, Mittel- und Hinterbrust mit einigen grünlichen und bläulichen Schüppchen. Schenkel glänzend schwarz, die hinteren die Deckenspitze deutlich überragend. (Zufolge der Deckenzeichnung erinnert die Art an *Pachyrrhynchus anellifer.*)

21. **Pseudapocyrtus formicarius** sp. nov. (Taf. II, Fig. 1.)

Niger, elytris subvirescenti-nigris, glabris; prothorace, scapo pedibusque (femoribus apice nigro excepto) rufis; prothorace

globoso, despumato-granuloso, sulco mediano tenui, margine antico elevato; elytris grosse regulariterque seriato-punctatis, globosis, basin versus sensim fortiterque angustatis; femoribus posticis elytrorum apice superantibus.

Long. 8.9, lat. 4.5 mm.

Patria: LUZON ORIENTALIS, legit *Dr. C. Semper*, M. St., et *J. Whitehead*, Br. M., M. Dr.

Schwarz, Flügeldecken etwas grünlich schwarz, Halsschildoberseite, Fühlerschaft und Beine, die schwarzen Schenkelspitzen ausgenommen, rot. Rüssel mässig dicht und fein punktiert, ohne Spur einer Basallinie, beiderseits der Länge nach kaum merklich eingedrückt, Stirn zwischen den Augen mit eingestochenem Punkt. Erstes Fühlergeisselglied etwas länger als das verlängerte 2., das 3. elliptisch, die folgenden kugelig, nach der Keule zu an Grösse zunehmend, diese länger als die 5 vorhergehenden Geisselglieder zusammengenommen. Halsschild kugelig, sehr wenig länger als breit, der glatt gewulstete Vorderrand breiter als der Basalrand, oberseits abgeschliffen gekörnelt, mit haarfeiner Mittelfurche. Flügeldecken 1½ mal so lang wie breit, gestreckt eiförmig, gewölbt, die Seiten von der Wurzel, die nicht breiter als die Halsschildbasis ist, bis zur halben Deckenlänge geradlinig divergierend, dann nach der Spitze zu elliptisch zugerundet, Streifen regelmässig gereiht-punktiert, an den Seiten etwas eingedrückt, die Punkte grob, mindestens so breit wie die Spatien. Über den Vorderhüften finden sich auf dem Thorax, über den Mittelhüften auf den Decken einige wenige, äusserst kleine grünliche Borstenschüppchen. Schenkel keulenförmig, die hinteren die Deckenspitze deutlich überragend. Das mir vorliegende männliche Exemplar (Mus. Stettin) zeigt das 1. und 2. Bauchsegment glatt und miteinander verwachsen, die folgenden 3 Abschnitte sind sehr fein punktiert und behaart.

22. **Pseudapocyrtus exsectus** sp. nov. (♀.)

Apocyrto inflato Er. similis, paulo major, rufo-brunneus, capite prothoraceque nigris; rostro subconico, sat crebre punctulato, fronte chloro-squamoso-maculata; prothorace globoso, longitudine paulo latiore, reticulato-sculpturato, spatiis vix granulosis, semel aut bis impunctatis, linea mediana chloro-squamosa; elytris globosis, irregulariter seriato-punctatis, margine apicali subter exciso (♀), macula ante apicali vittiforme chloro-squamosa; corpore subter nigro, femoribus in parte mediana tibiisque rufis; prothorace meso- et metasterno, ut segmento primo abdominali, lateribus chlorosquamosis.

Long. (rostro haud computato), 11.5, lat. 6.5 mm.

Patria: Insulae Philippinae, M. Dr. ex coll. *Th. Kirsch.*

Dem *A. inflatus* Er. noch ähnlicher als *imitator* und etwas grösser wie beide, durch die tiefe Ausrandung des Deckenseitenrandes vor der Spitze (nur beim ♀ ?) ausgezeichnet. Schwarz, die Decken, die Mitte der Schenkel, die Schienen und Tarsen rotbraun. Rüssel schwach konisch abgestumpft, mässig dicht und fein punktiert. Fühler ähnlich wie bei *imitator*, Stirn mit einer länglichen, vorn der Rüsselquernaht entsprechend, winkelig ausgeschnittenen grünlichen Schuppenmakel. Halsschild gewölblt, wenig breiter als lang, die grösste Breite etwas näher der Wurzel, netzartig mit ganz abgeschliffenen rundlichen Körnchen, die 1 oder 2 eingestochene Punkte zeigen, bedeckt, in der Mittellinie ein Streifen aus spärlichen grünlichen Schüppchen. Flügeldecken kräftig, aber selbst der 1. und 2. Streifen neben der Naht undeutlich, die beiden äussersten Streifen deutlich gereiht-, im übrigen verworren-punktiert, die Zwischenräume hie und da etwas querrunzelig zusammenfliessend, das vorletzte Spatium in der Basalhälfte so breit wie die Hinterschenkelwurzel, das letzte nur das vordere Deckendrittel einnehmend. Seitenrand der Decken über den Hinterecken des 2. Bauchsegmentes in vorn flach anliegenden, hinten plötzlich absteigendem Bogen ausgeschnitten, über dem Ausschnitt eine grün beschuppte Längsmakel. Seiten der Vorder-, Mittel-, und Hinterbrust mit grünen Schüppchen. Unterseite unpunktiert, Seiten des 2. Bauchsegmentes fein quernadelrissig, sein Hinterrand verrundet aufsteigend, sehr fein gerunzelt.

23. **Pseudapocyrtus imitator** sp. nov. (Taf. II, Fig. 2.)

Apocyrto inflato Er. simillimus, sed paulo minor; prothorace nigro, subcylindrico, lateribus vix rotundatis, crebre planeque granuloso, plerumque linea mediana cobaltino-squamosa; elytris globosis, apice abrupte productis, punctato-striatis, spatiis, praesertim secundo pone basin, plus minusve subcostatis, utrinque macula basali, altera laterali, transversa, duabus marginalibus, una suturali post medium, minutissima, et una anteapicali cobaltino-squamosis; corpore subter nigro, nitido, prosterno supra coxas, meso- et metasterno lateribus cobaltino-squamosis; pedibus rufis, femoribus apice nigris.

Long. (rostro haud computato) 8–9, lat. 4.5–5 mm.

Patria: LUZON, provincia Benguet, Irisan flumen, legit *R. C. McGregor* (Bur. Sci. Acc. No. 7239), M. Brux., *A. caudatus* Behrens in litt., Br. M., M. Dr.

Dem *Apocyrtus inflatus* Er. sehr ähnlich, aber etwas kleiner und das Halsschild an den Seiten sehr wenig gerundet. Dunkel rotbraun, Decken mit kleinen kobaltblauen Schuppenmakeln. Kopf hinter den flachen Augen nicht abgeschnürt, Rüssel zerstreut und fein punktiert, durch eine haarfeine winkelige Linie von der Stirn getrennt, diese leicht gewölbt mit hinten erlöschender, haarfeiner Mittellinie. Scheitel kaum wahrnehmbar chagriniert. Fühler dunkel rot, Schaft geschwungen, 1. und 2. Geisselglied gleich lang, je eines länger als das 3. und 4. zusammengenommen. Halsschild etwas länger als breit, wenig gewölbt, die Seiten schwach gerundet, ihre grösste Breite in der Mitte, Oberseite klein und ziemlich flach gekörnelt, mit einer Mittellinie von spärlichen blauen Schüppchen. Flügeldecken kugelig gewölbt, mit abgesetzt vorgezogenem Spitzenteil, grob gereiht-punktiert, die Punkte des 1. und 2. Streifens in der Deckenmitte leicht quer, nach der Spitze zu kleiner werdend, die dorsalen Spatien namentlich das 2. rippenartig vortretend, eine Makel von Augengrösse an der Wurzel, eine grössere, etwas quere, in der Mitte der Deckenseiten 2 kleinere, eine vor, eine hinter der Mitte des Seitenrandes, eine an der Spitze des 2. Spatiums und ausserdem zuweilen einige Pünktchen auf der Naht, hinter der Mitte, kobaltblau beschuppt. Unterseite schwarz glänzend, Seiten der Vorder-, Mittel-, und Hinterbrust mit bläulicher Schuppenmakel. Abdomen scheinbar nur zweiringelig, das 1. Segment von dem 2. in der Mitte nur durch eine sehr undeutliche Naht, an den Seiten durch eine grubig vertiefte Furche getrennt, 2. und 3. Abdominalsternit ganz verschmolzen, letzteres gerade abgestutzt, die übrigen Bauchschienen häutig und ganz zurückgezogen, von aussen nicht sichtbar. Hinterschienen am Innenrande nicht gereiht-gekörnelt.

24. **Pseudapocyrtus productus** sp. nov.

Niger, elytris rufo-fulvis, margine laterali nigricante, parte apicali subito producto; rostro indistincte punctato, fronte linea tenui mediana, antice furcata; prothorace subcylindrico, latitudine paulo longiore, despumato-granuloso; elytris rude confuseque seriato-punctatis, punctis spatiis latioribus, his transverse subrugulosis, parte apicali producto, parce griseo piloso, singulis apice minute obtusatis, macula utrinque in margine basali, duabus in margine laterali, anteriore rotundata, posteriore vittiforme ut lateribus pro-, meso- et metasterni, viridi-squamosis; femoribus, apice nigro excepto, rufis, elytrorum apice haud superantibus. Mas: sutura post secundem trientem tuberculo communi minuto.

Long. 12–13, lat. 6–6.5 mm.

Patria: Insulae Philippinae, legit *Dr. C. Semper*, M. St., M. Dr., Br. M. c. *Bowring*.

Schwarz, Flügeldecken rötlich gelbbraun (bis kastanienbraun), an den Seiten schwärzlich, an der Wurzel mit einer, am Seitenrande mit 2 grünlichen Schuppenmakeln. Rüssel fein punktiert, Stirn mit feiner vorn gegabelter Mittellinie. Fühlerschaft rötlich, 1. und 2. Geisselglied verlängert, das 2. länger als das 1.; die folgenden kurz elliptisch, das letzte kurz kegelförmig. Halsschild sehr wenig länger als breit, Basalrand etwas breiter als der glatte Apicalrand, oberseits abgeschliffen gekörnelt. Flügeldecken grob und vom 2. Streifen ab verworren gereihtpunktiert, die Punkte grösser als die hie und da querrunzelig zusammenfliessenden Zwischenräume. Die Decken an den Seiten, von der Wurzel bis zur Mitte, ziemlich geradlinig (kaum merklich eingebuchtet) nach hinten divergierend, dann kugelig gerundet, der Spitzenteil schnabelartig ausgezogen, jede Nahtspitze mit kleinem Höckerchen, der Spitzenrand neben der Naht bei dem ♀ sehr kurz und klein ausgerandet. Männchen hinter dem 2. Drittel der Naht mit kleinem gemeinsamen Höcker. Basalrand mit einer kleinen queren, Seitenrand vorn mit einer länglichen, hinten mit einer streifenartigen, Schuppenmakel; ebenso sind die Seiten der Vorder-, Mittel- und Hinterbrust grünlich beschuppt. Beine mit Ausnahme der schwarzen Schenkelspitzen rötlich, die Hinterschenkel die Deckenspitze nicht überragend.

Genus **MACROCYRTUS** nov.

Pachyrhynchidarum prope *Apocyrtus* Er.

Rostrum latitudine distincti longius, sectione transversa fere quadrata a fronte haud distinctum, dorso sulco mediano tenui. Antennarum scapus margine oculari postico superans. Oculi parum convexi. Elytra plerumque dorso depressiuscula. Sternita abdominalia primo secundoque connata, femina solum sternita tres aspectabilia. Tibiae posticae margine interno remote tuberculatae.

Typus der Gattung ist: *M. nigrans* Pasc. (=*contractus* Chevr.) ferner gehören noch hierher: *nigrans* var. *castanopterus* nov., *castaneus* Pasc., *subcostatus* sp. nov., *erosus* Pasc., (=*impressipennis* Chevr.= *Nigillus sculptus* Dohrn. in litt.) und *negrito* sp. nov.

25. **Macrocyrtus nigras** var. **castanopterus** nov.

Differt a specie typica colore castanea pedibusque, femoribus basi apiceque tarsisque nigris exceptis, rufis.

Diese Varietät von *nigrans* Pasc. ähnelt in der Färbung ausserordentlich dem *castaneus* Pasc.,[15] so dass sie leicht mit diesem vermengt werden kann; sie zeigt aber wie *nigrans* feine Punktstreifen und Spatien von der Breite der Naht, während *castaneus* Pasc. sehr dicht, fein und etwas ungeordnet gereiht-punktiert ist und eine glänzende gewulstet vortretende Naht aufweist.

26. **Macrocyrtus subcostatus** sp. nov. (Taf. II, Fig. 5.)

Fuscus, femoribus tibiisque, apice nigro excepto, rufis, prothorace longitudine latitudine basali aequali subtiliter punctato; elytris oblongo-ovatis, depressiusculis, sutura, margine laterali vittisque duabus dorsalibus subcostatis, nudis, reliquis subtiliter albido-setoso-squamosis; maris tibiis posticis margine interno dentibus obtusis remote seriatis.

Long. (capite haud computato) 15-18, lat. 7-8 mm.

Patria: LUZON, provincia Benguet, mons Pulog, legit. *R. C. McGregor* (Bur. Sci. Acc. No. 11446).

Dem *A. nigrans* Pasc. (mir liegen vom Autor bestimmte Exemplare vor[16]) verwandt aber grösser durch die Deckenrippen und die roten Beine, nur die ganzen Tarsen und die Schenkel, und an der Wurzel und Spitze schwarz, ausgezeichnet. Rüssel kaum 1½ mal so lang wie breit, der Rücken mit sehr seichtem länglich rechteckigem Eindruck und in diesem viel sparsamer punktiert als auf den schwach gewulsteten, etwas längs runzeligen Seitenkanten. Fühler viel schanker als bei *nigrans*, Schaft so lang wie der Kopf ohne Mandibel, nach der Spitze zu verbreitert und abgeflacht, 1. und 2. Geisselglied stark verlängert, gleich lang, zusammen so lang wie die übrigen Geisselglieder mit dem 1. Keulenglied, 3. Geisselglied 1½ mal so lang wie das 4., Keule gestreckt spindelförmig. Halsschild sehr wenig länger als an der Wurzel breit, Seitenränder fast gerade nach vorn etwas konvergierend, ziemlich dicht und fein punktiert, an den Seiten, nahe den Vorder- und Hinterecken vor und hinter der Mitte der Scheibe mit undeutlichen Makeln aus spärlichen bläulich weissen, quer gestellten Schuppenbörstchen. Basalrand durch eine Furche abgesetzt. Flügeldecken gestreckt elliptisch, oberseits abgeflacht, die Naht, das 2. Spatium der ganzen Länge nach, das 4. in der vorderen Hälfte und der Seitenrand wulstartig vortretend und fein runzelig, letzterer ausserdem mit 2 Reihen kräftiger Punkte, die Spatien mässig dicht bläulich weiss behaart-beschuppt. Erstes Abdominalsternit des Männchens concav querstreifig, 2. Sternit in der Mitte mit dem 1. ganz verschmolzen, nahe dem Seitenrande eine Längskante bildend.

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[15] Cistula Entomologica (1881), II, 2, 591.

[16] Cistula Entomologica (1881), II, 2, 593, wo es u. a. heisst: "elytra * * * broadest and somewhat angular at above the middle." Meine Stücke zeigen keine Spur eines winkeligen Seitenrandes.

27. **Macrocyrtus negrito** sp. nov.

Aterrimus, glaber, elytris subconfuse seriato-punctatis, squamulis viridibus aut coeruleis submaculatim adspersis; rostro subtiliter remoteque punctato, linea mediana sulcata, antice dilatata; prothorace longitudine paulo latiore, vix punctulato, basi distincte, apice subtiliter transverso-sulcato; elytris ovato-acuminatis, in mare subdepressiusculis, in femina convexis; maris femoribus posticis basi obtuse dentatis, tibiis posticis margine interno fortiter remoteque quadrituberculatis.

Long. (sine capite) 15–16, lat. max. 8 mm.

Patria: LUZON, provincia Benguet, Baguio, legit *H. M. Curran* (Bur. Sci. Acc. No. 9909).

Tief schwarz, wenig glänzend, mit sehr wenigen zuweilen unregelmässigen Makeln bildenden grünlichen oder matt blauen Schüppchen. Rüssel 1½ mal so lang wie breit, mit feiner vorn sich verbreiternder, ungefähr in der Höhe der Fühlerinsertion abgebrochener Mittelfurche. Fühlerschaft geschwungen, 1. und 2. Geisselglied zusammen mindestens so lang wie die übrigen Geisselglieder zusammengenommen, an Länge von einander wenig verschieden, jedes ungefähr so lang wie das kurz elliptische 3., 4. und 5. zusammengenommen, die Keule so lang wie die 5 vorhergehenden Geisselglieder, elliptisch zugespitzt, grau tomentiert. Kopf hinter den Augen mit einigen feinen Streifen. Halsschild sehr wenig breiter als lang, äusserst fein zerstreut punktiert, die gerundeten Seiten nach hinten zu etwas mehr als nach vorn zu konvergierend, mit sehr feiner Vorderrand- und kräftiger Hinterrandfurche, beiderseits nahe der Wurzel mit länglicher Schuppenmakel. Flügeldecken gestreckt eiförmig, 1½ mal so lang wie breit, beim Männchen oberseits etwas abgeflacht, beim Weibchen gewölbt (Seiten beim ♀ in der hinteren Hälfte, beim ♂ vor der Mitte mit breiten Längseindruck, der aber bei beiden Stücken den Eindruck einer anormalen Einknickung der Seitenflächen macht) mit feinen Punktreihen, die nach der Spitze zu unregelmässig werden. Nahtstreifen an der Wurzel nach aussen gebogen, Deckenspitze mit kräftigerer, börstchentragender Punktreihe. Deckenbeschuppung spärlich und unregelmässig marmoriert, der 2. und 4. Zwischenraum (der Nahtstreifen nicht mitgezählt) an der Wurzel streifenartig, kobaltblau beschuppt. Unterseite kahl, nur über den Vorderhüften und an den Seiten der Hinterbrust eine grössere blaue

Schuppenmakel. Die 2 von derselben Lokalität vorliegenden Exemplare sind von einander ziemlich abweichend, doch dürften die Unterschiede nur auf die Geschlechtsdifferenz zurückzuführen sein. Das weibliche Exemplar zeigt die Flügeldecken an der Nahtspitze verkürzt, so dass sie an der Naht kurz winkelig ausgeschnitten erscheinen, auch sind bei diesem nur 3 Bauchschienen sichtbar, von denen die 2. mit der 3. im mittleren Drittel vollkommen verschmolzen ist. Das männliche Stück zeigt 5 Bauchschienen, von denen die 1. flach eingedrückt und undeutlich punktiert ist und die 2. ebenfalls im mittleren Drittel mit der 1. verschmolzen ist. Die beim Männchen mehr rötlichen Beine haben an der Wurzel der Hinterschenkel einen stumpfen kleinen Zahn und die Hinterschienen sind am Innenrande mit 4 grossen stumpfen Höckerchen bewehrt. Beim Weibchen sind die Hinterschenkel einfach und die Hinterschienen am Innenrande viel undeutlicher gereiht gekörnelt.

Nach Abfassung dieser Beschreibung erhielt ich vom Museum in Stettin ein als *Pachyrrhynchus depressus* Behrens in litt. bezeichnetes weibliches Exemplar und noch später vom Königlichen Museum in Berlin ein ganz ähnliches ♂ die ich kein Bedenken trage zu dieser Art (*negrito*) zu stellen. Es ist durch guten Erhaltungszustand ausgezeichnet und seine hellgrünen Schuppenmakeln finden sich an denselben Stellen, die bei den oben erwähnten Exemplaren durch mattere Struktur als einstiger Untergrund der Beschuppung erkenntlich sind. Da aber möglicherweise doch eine neue sehr nahe verwandte Art mit *P. negrito* vorliegt, so gebe ich eine Beschreibung der hellgrünen Schuppenmakeln wie folgt: 2. Spatium im basalen Fünftel und apicalen Drittel, sowie eine Querreihe von kleinen Pünktchen am Basalrand der Decken, ferner eine kreisrunde Makel, von Augengrösse, in der Mitte neben der Naht (den 1. und 2. Zwischenraum ausfüllend) und von da aus eine schräg nach aussen und hinten ziehende Querreihe von 3 Längsmakeln, sowie der Deckenseitenrand über der Hinterbrust und über dem 1. und 2. Bauchsegment blass gelblichgrün beschuppt. Gleiche Färbung der Beschuppung zeigt der Vorderrand des Halsschildes und jederseits in seinen Hinterecken eine Längsmakel.

Genus **NOTHAPOCYRTUS** nov.

Pachyrrhynchidarum prope *Apocyrtus.*

Rostrum latitudine longius a fronte haud distinctum, dorso longitudinaliter impresso. Oculi plassiusculi. Prothorax latitudine longius. Elytra margine basali haud carinato. Femora postica elytrorum apice distincte superantia.

Durch die fehlende Basalquerfurche des Rüssels, das längliche Halsschild, die am Basalrand nicht geleisteten Decken, und die diese deutlich überragenden Hinterschenkel war ich gezwungen 3 untereinander habituel ziemlich verschiedene Arten generisch von den übrigen Apocyrtiden-Gattungen auszuscheiden.

Erst wenn mehr Material und vor allem beide Geschlechter der hier nach Einzelnstücken beschriebenen Arten bekannt sein werden, wird man entscheiden können ob eine weiter generische Aufteilung nötig ist.

Typus der Gattung ist: *N. translucidus* sp. nov., ferner stelle ich vorläufig noch hierher *cylindricollis* sp. nov., und *erythromerus* sp. nov.

28. **Nothapocyrtus translucidus** sp. nov. (♀.)

Niger, elytris, basi apiceque nigricantibus exceptis, rufo-flavescentibus; rostro dorso concavo, carinulis lateralibus retro convergentibus, fronte squamulis nonullis cobaltinis; prothorace latitudine distincte longiore, lateribus in triente apicali paulo rotundato convergentibus, irregulariter parceque punctato, utrinque in dimidia parte basali linea cobaltino-squamosa; elytris oblongo-ovatis, translucide ac sexangulare reticulatis ac remote seriato-punctatis; pro-, meso- et metasterno, ut primo segmento abdominali lateribus, parce cobaltino squamosis; femoribus clavatis perparce albido-setulosis, posticis elytrorum apice superantibus.

Long. 6, lat. 2.5 mm.

Patria: LUZON BOREALIS, M. Dr. No. 17780 et D. E. M.

Schwarz, Flügeldecken mit Ausnahme eines schwarzen schmalen Basalstreifens und der äussersten schwarzen Deckenspitze, rötlich gelbbraun. Rüssel etwas länger als breit, ohne Basalfurche, oberseits der Länge nach eingedrückt, der Rüsselrücken von 2, nach hinten zu konvergierenden Längswülsten begrenzt, zerstreut und kräftig punktiert, Stirn zwischen den Augen concav mit eingedrückter Mittellinie. Halsschild glänzend, länger als breit, die Seiten in den basalen 2 Dritteln näherzu parallel, dann nach vorn konvergierend, oberseits unregelmässig und ziemlich entfernt punktiert, beiderseits innerhalb des Seitenrandes mit einer von der Basis bis zur Mitte nach vorn reichenden blauen Schuppenlinie. Flügeldecken mit durchscheinender hexagonaler Netzstruktur und derartig gereiht-punktiert, dass je ein Punkt den Mittelpunkt einer Netzmasche bildet. Unterseite glänzend schwarz, Seiten der Vorder-, Mittel- und Hinterbrust sowie des 1. Bauchsternites spärlich kobaltblau beschuppt. Analsegment mit Hinterrandfurche. Schenkel gekeult, die hinteren die Deckenspitze etwas überragend und spärlich und fein bläulich weiss behaart.

29. **Nothapocyrtus cylindricollis** sp. nov. (♂, Taf. II, Fig. 6.)

Niger, femoribus subrufescenti-nigris, rostro fronteque longitudinaliter impressis, impressione, ut macula intraoculari, albosquamosis; prothorace latitudine longiore, subpunctato, lateribus vix rotundatis, utrinque in dimidia parte basali vitta, in angulis anticis macula minuta, albo-squamosis; elytris oblongo-ovatis, sat regulare seriato-punctatis, singulis maculis punctisque circiter 12 albo-squamosis; femoribus posticis elytrorum apice distincte superantibus.

Long. (rostro haud computato) 10, lat. 4 mm.

Patria: LUZON, legit *Dr. von Möllendorff*, M. Dr., No. 11209.

Schwarz, Kopf zwischen und unter den Augen mit einer weisslichen Schuppenmakel. Rüssel so lang wie breit, oberseits in der Basalhälfte mit flachem quer viereckigem Eindruck, fein und mässig dicht punktiert, hinter dem Eindruck mit einer zwischen die Augen hinaufreichenden weiss beschuppten Längsmakel, Scheitel kaum punktiert. Fühler etwas rötlich, Geissel ziemlich kräftig, 1. Glied der Fühlergeissel wenig länger als das 2., alle folgenden deutlich länger als breit, das letzte etwas dicker und rundlicher als das vorletzte. Halsschild ziemlich cylindrisch, etwas länger als breit, mässig dicht erloschen punktiert, in den Vorderecken mit einer kleinen Makel, in der Basalhälfte innerhalb des Seitenrandes mit einem Streifen aus weissen Schüppchen. Flügeldecken 1½ mal so lang wie breit, gestreckteiförmig, gereiht-punktiert, die Punkte klein aber scharf ausgeprägt und von einander fast um Spatienbreite entfernt, jede Decke mit ungefähr 12 weisslichen Schuppenmakeln, 4 nur wenig kleiner als das Auge, in ziemlich gleichen Abständen auf dem 2. Spatium, eine kleine an der Schulter, und eine im 2. Drittel auf dem ersten Spatium, 2 auf den Randspatien, eine vor, die andere hinter den Hinterhüften, und 4–5 an den Deckenseiten. Beine dunkel rotbraun, die Hinterschenkel die Deckenspitze deutlich überragend, Hinterschienen am Innenrande fein gereiht-gekörnelt. Seiten der Vorder-, Mittel- und Hinterbrust, sowie die des ersten Bauchsegments, weiss beschuppt. Erstes Bauchsegment in der Mitte der Länge nach eingedrückt (♂) und querrunzelig.

30. **Nothapocyrtus erythromerus** sp. nov. (♂.)

Niger, sat nitidus, femoribus parte mediano rufo; rostro latitudine sesqui longiore, dorso impressione subtrigona obsoleta, sat fortiter punctato, linea impressa mediana vix observanda, fronte subtilissime remoteque punctata, ut rostro breviter setulosa; antennis funiculi articulo primo secundo longiore; protho-

race latitudine distincte longiore, lateribus perpaulo rotundatis, sat remote punctato ac breviter setuloso, lateribus parce glauco-squamosis; elytris elongato-ellipticis, remote regulariterque seriato-punctatis, margine basili haud elevato, parce subtilissimeque setulosis lateribus apiceque squamulis glaucis perpaucis, utrinque ante medium in macula transversa condensatis; femoribus in triente mediano rufis; corpore subter subtilissime parceque setuloso.

Long. 10, lat. 3.8 mm.

Patria: LUZON, legit *Dr. A. Schadenberg*, M. Dr. No. 6333.

Eine der schlankesten Arten unter den Pachyrrhynchiden, ziemlich glänzend schwarz überall fein und zerstreut kurz behaart, die Schenkel im mittleren Drittel rot. Rüssel 1½ mal so lang wie breit, auf dem Rücken mit grossem flachem, länglich dreieckigem Eindruck und haarfeiner kaum wahrnehmbarer Medianfurche und ohne Basalquerfurche, ziemlich kräftig punktiert und sowie die Stirn spärlich mit feinen querliegenden Härchen besetzt. Rüsselseiten vor den Augen mit ungefähr quadratischem, glatten Feld das vorn durch einen seichten spitzwinkelig auf die Fühlerfurche stossenden Schrägeindruck begrenzt wird. Fühler rötlichbraun, das 1. Geisselglied länger als das 2., die letzten kugelig, das letzte etwas grösser als das vorletzte. Halsschild länger als breit, an den Seiten sehr wenig gerundet, am Vorderrande schmäler als am Hinterrand, ersterer oberseits ohne Randfurche, mässig dicht punktiert und sehr fein spärlich behaart, die Seiten mit einigen bläulich weissen Schüppchen. Flügeldecken schmal, gestreckt elliptisch, mit regelmässigen entfernt punktierten Reihen, jeder Punkt je mit einem, die Zwischenräume nur hie und da mit einem feinen kurzen weisslichen Härchen, ausserdem am Seitenrande, vor der Deckenmitte und im Spitzenteil mit bläulich weissen Schüppchen die auf dem 6.-7. Zwischenraum, vor der Deckenmitte zu einer undeutlichen Quermakel verdichtet sind. Körperunterseite spärlich und fein weisslich behaart, das 1. und 2. Bauchsegment des ♂ mit tiefem Längseindruck.

Genus **METAPOCYRTUS** nov.

(*Apocyrtus* aut. pars.)

Rostrum apice haud tumido, sulco basali, transverso, manifesto. Caput post tempora haud constrictum, oculi parum convexi. Antennae scapo oculi marginem posticum attingente aut ultra marginem extenso. Elytra margine basali plerumque elevato (Homalocyrto excepto).

Die Gattung *Apocyrtus* Er. ist unglücklicherweise auf eine so isolierte Form (*inflatus* Er.) gegründet, dass es unmöglich erscheint, nach dem Standpunkt der heutigen Systematik, die übrigen als *Apocyrtus* beschriebenen Arten mit ihr in einer Gattung zu belassen. Für letztere wird die Gattung *Metapocyrtus* in Vorschlag gebracht, die der Übersichtlichkeit wegen in eine Reihe von Gruppen die zum Teil noch unnatürlich erscheinen, geteilt werden musste. Unter Hinweis auf die weiter vorn gegebene Bestimmungstabelle der Gattungen und Untergattungen der Pachyrrhynchidae sei folgende Artaufzählung der verschiedenen Untergattungen und im Anschluss daran Bemerkungen über ältere und Beschreibungen neuer Arten gegeben:

1. Subgenus Artapocyrtus nov.

Hierher gehören *A. bifaciatus* Waterh., *derasocobaltinus* sp. nov., *geniculatus* Waterh., *humeralis* sp. nov., *pardalis* sp. nov., und *quadriplagiatus* Roelofs.

Die Weibchen unterscheiden sich von den Männchen durch zwei Längseindrücke auf dem Analsternit, ausserdem sind die Decken des ♀ bei *bifasciatus* im Spitzendrittel der Naht seitlich zusammengedrückt und über die Nahtspitze nach hinten gezogen, bei *humeralis* im 2. Drittel mit einem kleinen sparsam bewimperten Doppelkorn an der Naht versehen.

Übersicht der Artapocyrtus-Arten.

*a*¹. Rüssel unterseits an der Kehle mit einem grossen, nach hinten gerichtetem Zapfen.
  *b*¹. Rüsselrücken deutlich nach vorn verbreitert, trapezoidal, Decken an der Wurzel und vor der Spitze mit sehr breitem, vom ungefähr 2. Punktstreifen bis an den Seitenrand reichenden Querflecken. Halsschild glänzend, zerstreut punktiert................ quadriplagiatus Roelofs.
  *b*². Rüssel nach vorn zu ein wenig verschmälert, Decken mit unregelmässigen Schuppenflecken, Halsschild dicht runzelig gekörnt. 31. derasocobaltinus sp. nov.
*a*². Rüssel unterseits ohne Zapfenbildung.
  *c*¹. Flügeldecken mit Basal- und Anteapicalbinde.
    *d*¹. Deckenstreifen einreihig und ziemlich regelmässig, Apicalbinde sehr breit grün (sp. typ.) oder goldig rötlich violett (var. *aurora* Dohrn in litt.). Spitzendrittel der Naht beim ♀ seitlich stark zusammengedrückt und vorgewölbt, Schulterregion leicht eingedrückt mit Tuberkel .... bifasciatus Waterh.
    *d*². Deckenstreifen verworren doppelreihig, Halsschild dicht, etwas körnig punktiert, Schuppenbinden schmal, Schulterregion in beiden Geschlechtern eingedrückt, mit Tuberkel, Naht des ♀ mit doppelten Tuberkel im 2. Drittel ihrer Länge. 32. humeralis sp. nov.

c^2. Flügeldecken ohne Querbinden.

e^1. Halsschild dicht körnig punktiert, Decken spärlich und zerstreut bläulich beschuppt, Analsegment des ♀ mit elliptischem Spitzenausschnitt, die Naht im 2. Drittel mit kleinem Tuberkel.
geniculatus Waterh.

e^2. Halsschild unregelmässig zerstreut punktiert, Decken mit 16 grossen Schuppenmakeln. Analsegment des ♀ mit 2 die ganze Länge einnehmenden ovalen Gruben .... 33. pardalis sp. nov.

31. **Metapocyrtus (Artapocyrtus) derasocobaltinus** sp. nov. (♀.)

Niger, squamulis cobaltinis vel auratis nebuloso-maculatus, pedibus, femoribus apice nigro exceptis, rufis; rostro dorso subquadrato convexo, sat crebre punctato, in dimidia parte basali sulco mediano ac utrinque intra marginem lateralem longitudinaliter ac vage impresso, subter, post mentum, cono valido, retro directo, armato; prothorace latitudine paulo longiore, convexo, subpunctato-ruguloso; elytris plus regulariter ac minutius quam in geniculato Waterh., seriato-punctatis, plagis subimpressis irregularibus cobaltino-squamosis, sutura in parte declivi parce fulvo-ciliata; corpore subter in lateribus pro-, meso- et metasterni et segmenti abdominalis primi squamosis, segmento ultimo utrinque impressione oblonga, permagna.

Long. 11.5–12, lat. 5–5.2 mm.

Patria: LEYTE, M. Dr., No. 17248 (a *Dr. Staudinger* et *Bang-Hass'* partus) et Br. M. (sine origine).

Dem *M. geniculatus* Waterh. verwandt und sowie dieser mit roten, nur an den Schenkelspitzen schwarzen Beinen und vor allem durch die wie bei *quadriplagiatus* Roelofs sich findende conische Bewehrung der Rüsselunterseite ausgezeichnet. Schwarz, ziemlich glänzend, unregelmässig fleckig beschuppt, die Schuppen kobaltblau oder (namentlich nach den Seiten und der Spitze zu) zuweilen in Goldgrün[17] übergehend. Rüssel höchstens so lang wie breit, ziemlich dicht punktiert und stark gewölbt, in der Basalhälfte, ausser der tiefen Mittelfurche, beiderseits innerhalb des Seitenrandes mit seichtem, vorn sich verjüngendem Längseindruck, die Wurzel dieses sowohl als auch die quere Stirn, zwischen den Augen bläulich beschuppt. Fühler rothbraun bis schwärzlich, das 1. Geisselglied länger als das 2., die folgenden kurz birnförmig, etwas länger als breit. Halsschild leicht quer mit stark gerundeten Seiten, runzelig punktiert, die

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[17] Letzere Färbung dürfte bei tadellos erhaltenen Stücken die vorherrschende sein, denn wie bei anderen Arten wird auch hier die kobaltblaue Farbe infolge zerstörender Einflüsse aus der goldgrünen hevorgegangen sein.

Runzeln hinter der Halsschildmitte quer verlaufend, der ringsum durch eine Furche abgesetzte Vorderrand durchaus von gleicher Breite. Flügeldecken gestreckt eiförmig, in der Schultergegend mit flachem, vorn zuweilen ein Höckerchen aufweisenden Eindruck, weniger dicht und weniger unregelmässig wie bei *M. geniculatus* Waterh. gereiht-punktiert, die Spatien breiter als die Punktreihen und als solche deutlich erkennbar, Naht im abschüssigen Teil mit einzelnen, abstehenden, gelblichen Härchen. Die Beschuppung besteht aus unregelmässig verteilten Nebelflecken, die nur im Spitzenteil und am Seitenrand der Decken zu einem dichteren Schuppenkleid zusammengedrängt erscheinen. Unterseite neben der Beschuppung der Vorder-, Mittel- und Hinterbrustseiten und der Seiten des ersten Bauchsternites mit zerstreuten, feinen, gelblichen Härchen. Letztes Bauchsternit (♀) mit zwei grossen länglichen am Innenrand sich berührenden Längseindrücken, so dass die Mitte des Basalrandes als dreieckige Schwiele vortritt. Hinterschenkel die Deckenspitze sehr wenig überragend.

32. **Metapocyrtus (Artapocyrtus) humeralis** sp. nov. (♂, ♀.)

Niger, vix aenescens, femoribus, apice nigro excepto, tibiisque rufis, elytris fascia basali et anteapicali glauco- aut viridescenti- aut aurato-squamosis; rostro fere quadrato convexo, sat remote punctato, in dimidia parte basali sulco mediano; prothorace longitudine latitudine aequali, globoso, crebre rugoso-granulato, disco granulis transverse subconfluentibus, margine antico squamoso; elytris oblongo-ovatis, irregulariter geminato- ac seriato-punctatis, regione humerali late impressa et subter tuberculo armata, fascia basali altera subarcuata ante apicem vittaque post mediana, marginali, glauco-squamosis; sutura in parte declivi remote seriato-ciliata, in femina tuberculo gemino; corpore subter segmenti primi, pro- et metasterni lateribus squamosis, reliquo parce setuloso; feminae segmento ultimo utrinque stria basali impressa, apice exciso.

Long. 12, lat. 5.4 mm.

Patria: LEYTE, M. Dr. No. 17297.

Schwarz, schwach grünlich erzschimmernd, die Beine, mit Ausnahme der Schenkel- und Schienenspitzen sowie der Tarsen, rot. Rüssel so lang wie breit, gewölbt, Basalhälfte mit Mittelfurche, mässig dicht, in der Apicalhälfte dichter punktiert. Fühler schwärzlich, 1. und 2. Geisselglied verlängert, die übrigen kurz kegelförmig. Halsschild so lang wie breit, kugelig gewölbt, oberseits dicht und ziemlich fein runzelig gekörnt, die Körnchen in der Basalhälfte des Halsschildes querrunzelig. Vorderrand und die ganzen Seiten des Halsschildes beschuppt. Flügeldecken gestreckt eiförmig, mit tiefen verworrenen Doppelpunktstrichen, die Schultergegend mit grossem flachem Eindruck und dieser am Vorderrande (an der Wurzel des vorletzten Spatiums) mit einem von oben sichtbaren Tuberkel. Basalrand der Decken sowie eine quere gebogene Binde hinter der Mitte und eine Längsmakel am Seitenrand über dem zweiten Bauchsegment grünlich oder bläulich weiss beschuppt. Naht im Spitzendrittel mit entfernt gereihten abstehenden Wimpern, beim ♂ zu Beginn der Abschrägung kaum merklich schwielig aufgetrieben, beim ♀ mit einem Doppelkörnchen. Unterseite mit beschuppten Seiten des 1. Bauchsternites und der Vorder- und Mittelbrust, im übrigen sparsam fein bewimpert. Analsegment des ♀ jederseits mit kurzer Längsfurche.

33. **Metapocyrtus (Artapocyrtus) pardalis** sp. nov. (♂, ♀, Taf. I, Fig. 5 u. 5a.)

Niger, guttis rosaceo-squamosis ornatus; rostro latitudine vix longiore, antrorsum sensim dilatato, nitido, in dimidia parte basali sulco mediano impresso, fortiter convexo, sat dense punctato, sulco transverso-basali albido-squamoso, fronte remote punctato, area anteoculari glabra, impressione verticali; prothorace globoso, latitudine longitudine aequali, sat remote punctato, margine antico maculisque duabus discalibus postmedianis alterisque majoribus supracoxalibus, albido-squamosis; elytris parum viridiaeneo-micantibus sat fortiter regulariterque seriato-punctatis, maculis magnis XVI, seriebus quatuor transversis formantibus, ornatis, macula exteriore in seria secunda transversa, macula marginali in seria tertia oblonga, reliquis subrotundatis, sutura in declivitate remote ciliata; pedibus, femorum tibiarumque apicibus tarsisque nigris exceptis, rufis ac ut corpore subter parce setulosis, metasterno segmentoque primo abdominali lateribus squamosis, segmento ultimo (♀) biexcavato.

Long. 10.2-11, lat. 4-5 mm.

Patria: Insulae Philippinae, M. Dr. ex coll. *Faust* (*A. astriger* Dohrn. in litt.) et M. Brux.

Diese Art erinnert zufolge der Verteilung und Färbung der Schuppenmakeln an *Metapocyrtus 14-punctatus* Hell., weist sich aber durch den kurzen, breiten, stark gewölbten Rüssel und die die Deckenspitze nicht überragenden Hinterschenkel sofort als in die Verwandschaft des *bifasciatus* Waterh. gehörig aus. Schwarz, die Flügeldecken etwas erzgrün schimmernd, die Beine mit Ausnahme der schwarzen Tarsen, Schenkel und Schienenspitzen, dunkel rot. Rüssel ziemlich dicht punktiert, in der Basalhälfte mit Mittelfurche, die Basalquerfurche tief, die Seitenkanten des Rüssels nicht durchschneidend und dicht rötlich weiss beschuppt. Rüsselseiten vor den Augen mit ganz glatter Fläche und einem senkrecht auf die Fühlerfurche stossendem seichten Vertikaleindruck. Fühler rötlich schwarz, das 1. und 2. Geisselglied verlängert, gleich lang, die folgenden oval bis schwach kegelförmig, das 5. das kürzeste, fast kugelig, das 6. sehr deutlich länger als das 5. und 7. Halsschild so lang wie breit, kugelig, ziemlich kräftig zerstreut punktiert, in der Mitte der Basalhälfte fein querrunzelig, dicht am Vorderrande mit Andeutung einer Mittelfurche, der Vorderrand und jederseits innerhalb des Seitenrandes hinter der Mitte eine Makel von über Augengrösse, rötlich weiss beschuppt. Flügeldecken ziemlich regelmässig und kräftig gereiht-punktiert, der letzte und vorletzte Streifen über dem 1. Bauchsternit tief gefurcht, die Naht im abschüssigen Teil mit sehr entfernten, abstechenden Wimpern. Die Schuppenmakeln der Decken gross, 4 Querreihen bildend, jederseits 2 Makeln von Augengrösse an der Basis, 2 vor der Mitte, von denen die äussere quer und fast doppelt so gross wie die innere ist, 3 hinter der Mitte, von denen die mittlere nach hinten verschoben, die äussere am Seitenrande steht und längsstreifig ist und je eine längliche Apicalmakel. Unterseite fast ganz glatt, mit einzelnen gelblichen nach hinten gekrümmten Härchen, die auf dem 3. und 4. Bauchsternit zu ziemlich regelmässiger Querreihe geordnet sind. Analsegment (♀) mit 2, die ganze Länge und Breite ausfüllenden Längsgruben, so dass die Mitte des Basalrandes als dreieckige glatte Schwiele hervortritt.

2. Subgenus Sphenomorphoidea nov.

Hierher gehören *S. metallicus* Waterh. (mit den Varietäten: *laevicollis* Waterh. *sphenomorphoides* nov. und *suavis* nov.), *mimicus* sp. nov. und *14-punctatus* sp. nov.

Die Geschlechter dieser Gruppe sind äusserlich wenig von einander verschieden. Die am längsten bekannte Art *metallicus* Waterh. ist in der Verteilung der Schuppenmakeln sehr veränderlich; die hauptsächlichsten Varietäten dieser Art lassen sich wie folgt unterscheiden:

a^1. Flügeldecken mit drei Querreihen von je 4 Schuppenpunkten und einem apicalen Schuppenpunkt.
  b^1. Halsschild auf der Scheibe jederseits mit Schuppenpunkt, Körperoberseite mehr oder weniger erzfarben, zuweilen purpurn übergossen .... metallicus Waterh.
  b^2. Halsschild auf der Scheibe ohne Schuppenmakeln, Körperoberseite schwarz .... 34. metallicus var. suavis nov.

a^2. Flügeldecken in der Mitte statt mit 4 Schuppenmakeln mit einer Schuppenquerbinde.......................... 35. metallicus var. sphenomorphoides nov.
a^3. Flügeldecken an der Basis und in der Mitte mit Schuppenquerbinde.
metallicus var. levicollis Waterh.

36. **Metapocyrtus** (Sphenomorphoidea) 14-punctatus sp. nov.

Niger, punctis viridi-auratis ornatus; rostro latitudine sesqui longiore, dorso convexo, lateribus parallelis, in dimidia parte basali linea mediana impressa ac utrinque pone marginem lateralem sulco obsoleto; prothorace globoso, subtilissime coriario et sat crebre punctato; margine antico utrinque maculaque utrinque pone medium punctiformi, auroto-squamosis; elytris prothorace paulo latioribus regulariter fortiterque seriato-punctatis, singulis maculis rotundatis septem, oculi magnitudine, et quidem quatuor basalibus inter striam septimam et nonam, una basali, altera apicali inter striam nonam et decimam; corpore subter glabriusculo, femoribus elytrorum apice superantibus, tibiis posticis distincte compressis, in triente apicali incurvatis.

Long. 7.5-9.8, lat. 3.5-4.5 mm.

Patria: Insulae Philippinae, Br. M. et M. Dr. ex coll. *Fry* 33294.

Schwarz, Flügeldecken mit 14 rötlich, oder grünlich goldigen Schuppenmakeln, von ungefähr Augengrösse. Rüssel 1½ mal so lang wie breit, der Länge nach gewölbt, mit parallelen, scharfen Seitenkanten, ziemlich dicht und kräftig punktiert, in der Basalhälfte mit eingedrückter Mittellinie und beiderseits innerhalb des Seitenrandes mit mehr oder weniger deutlichem Längseindruck. Rüsselseiten vor den Augen mit Längseindruck. Fühler rötlich braun, der Schaft nach der Spitze zu etwas verbreitert und flach gedrückt, das 1. Geisselglied länger als das 2. die folgenden 2 wenig länger als breit, die letzten 3 kugelig. Halsschild so lang wie breit, kugelig, äusserst fein chagriniert und ausserdem ziemlich dicht punktiert, beiderseits am Vorderrande, hinter den Augen, mit einer queren, über den Vorderhüften mit einer grösseren und in der Mitte innerhalb des Seitenrandes mit einer kleineren runden, goldig beschuppten Makel. Flügeldecken wenig breiter als das Halsschild, mit 11 tiefen regelmässigen Punktreihen, nur die 3., 4. und 5. Reihe im Spitzenteil verworren, zwischen dem 2. und 4. Punktstreifen und die beiden Spatien ganz ausfüllend, mit 4 von einander ungefähr gleich weit entfernten, goldigen Schuppenpunkten, ein ähnlicher Punkt liegt zwischen dem 7. und 9. Spatium vor der Deckenmitte und einer an der Spitze des 5. und 6. Spatiums (bei einem der beiden Exemplare kaum angedeutet) und je einer an der Wurzel und im

2. Drittel der Decken, zwischen dem 9. und 11. Punktstreifen, so dass im ganzen 3 Querreihen, eine basale und eine antemediane mit je 4, eine subapicale mit 4–6, und eine apicale mit 2 Punktmakeln gebildet werden. Körperunterseite fast ganz unbeschuppt, nur die Seiten der Hinterbrust und zuweilen auch das erste Bauchsternit mit goldigen Schüppchen, im übrigen nur undeutlich punktiert und mit feinen zerstreuten greisen Härchen besetzt, Analsternit zerstreut und ziemlich kräftig punktiert, beiderseits innerhalb des Seitenrandes mit Furche (♂). Beine mit fein und zerstreut schwärzlich behaarten Schienen und an der Wurzel fein querrunzeligen Schenkeln, von denen die hinteren die Deckenspitze stark überragen.

37. **Metapocyrtus (Sphenomorphoidea) mimicus** sp. nov.

Violaceo-purpureus, elytris Pachyrrhyncho nobili Hell., similiter lineis albido-squamosis decoratis; rostro latitudine sesqui longiore, haud squamoso, parce punctulato, dorso in dimidia parte basali sulco mediano profundo, in fronte continuato; antennis nigris, funiculi articulis 3°- 7° latitudine longioribus; prothorace longitudine latitudine aequali, globoso, levi, margine antico posticoque sulphureo-squamosis; elytris elyptico-globosis, subtiliter subseriatim-punctatis, spatio secundo pone basin lineola brevi, linea marginali apice per spatium secundum antrorsum curvata et post elytrorum dimidium abbreviata, altera transversa, ad suturam interrupta, in elytrorum dimidia parte maculaque minuta longe ante spatii sexti apicem, sulphureo-squamosis; femoribus clavatis, posticis elytrorum apice paulo superantibus.

Long. 10.5, lat. 5 mm.

Patria: Insulae Philippinae, legit *Dr. C. Semper*, unicum M. St.

Die Art ähnelt zufolge der Gestalt, Farbe und Verlauf der hellen Schuppenlinien so sehr an *Pachyrrhynchus nobilis* Hell. dass sie schon von Behrens als *P. imitator* in litt. bezeichnet wurde. Der an der Spitze nicht plötzlich querwulstartig verdickte Rüssel, der an der Wurzel durch eine wenn auch relativ feine, Querfurche abgegrenzt ist, sowie der lange geschwungene Fühlerschaft weisen aber darauf hin, dass kein *Pachyrrhynchus*, sondern eine mehr mit *Apocyrtus* verwandte Gattung vorliege. Rüssel 1½ mal so lang wie breit, fein zerstreut punktiert, in der Basalhälfte mit tiefer Mittelfurche. Fühler schwarz, der geschwungene Schaft den Augenhinterrand erreichend, 1. und 2. Geisselglied verlängert, ungefähr gleich lang, das 2. so lang wie die 3 folgenden zusammen, das 3. länger als das elliptische 4., das letzte (6.) ziemlich kugelig. Halsschild so lang wie breit, kugelig gewölbt, unpunktiert, am Vorderrand etwas breiter als am Hinterrand, beide Rände gelblich weiss beschuppt. Flügeldecken fein und nur teilweise gereiht-punktiert, ein Längsstrich auf dem 2. Spatium hinter der Wurzel, ein Seitenrandstreifen, der sich auf dem hinteren Drittel des 2. Spatiums wieder nach vorn umbiegt, eine durch die Naht unterbrochene Querlinie, die fast bis zum vorletzten Punktstreifen nach aussen reicht und endlich eine kleine längliche Makel weit vor der Spitze des 6. Spatiums, sowie die Seiten der Hinterbrust, schwefelgelb beschuppt. Unterseite glatt, die Ränder der Bauchschienen fein schräg strigiliert, Schenkel keulenförmig, die hinteren die Deckenspitze etwas überragend.

3. Subgenus **Sclerocyrtus** nov.

Die einzige Art, *asper* sp. nov., die zur Errichtung dieser Untergattung Anlass gab, zeigt einen der Länge nach gewölbten, an der Wurzel beiderseits wie bei *Artapocyrtus* rechtwinkelig abfallenden, aber längeren Rüssel. Als besonders charakteristisch ist der an den Seiten nach unten sich verbreiternde Halsschildvorderrand anzusehen, der auf der Vorderbrust plötzlich auf die halbe Breite verschmälert ist und so zu einer Augenlappenähnlichen Bildung führt. Die Weibchen sind nur durch grössere Breite der Decken und kürzere Schenkel, die die Deckenspitze sehr wenig (beim ♂ dagegen beträchtlich) überragen, ausgezeichnet.

38. **Metapocyrtus (Sclerocyrtus) asper** sp. nov.

Niger, squamulis albidis punctatim adspersus; rostro latitudine longiore, antrorsum sensim dilatato, dorso convexo, remote sat fortiter punctato, sulco mediano rostri basin haud attingente, spatio anteoculari plano, glabro; prothorace latitudine paulo longiore, lateribus in dimidia parte basali fere rectis, rugoso-granoso, spatiis squamulis adspersis, sulco marginali; antico, supra deficiente, carinula basali tenui; elytris ovatis, granulosis substriatis, spatiis inter granulis remote punctato-squamosis; pedibus parce glauco setulosis.

Long. 7.5-10, lat. 4-5 mm.

Patria: Insulae Philippinae, M. Dr. ex coll. *Dohrn.* (*Apocyrtus asper* Boh. in litt.)

Eine gedrungene durch die Skulptur und die weitläufige, aber gleichmässig zerstreuten kleinen Schuppenpunkte leicht kenntliche Art. Rüssel länger als breit, nach vorn zu deutlich verbreitert, seine Dorsalfurche nicht mit der Basalfurche zusammenstossend, sondern weit vor dieser abgebrochen, seine Seiten vor den Augen mit ebener glatter, länglicher Fläche, die vorn durch einen rechtwinkelig auf die Fühlerfurche stossenden Eindruck begrenzt wird. Stirn und Rüsselbasalfurche scharf rechtwinkelig aufeinander stossend, erstere mit einzelnen Schüppchen. Die ersten Geisselglieder der Fühler verlängert, ziemlich gleich lang, die folgenden kegelförmig, das letzte deutlich länger als breit. Halsschild etwas länger als breit, die Seiten sehr wenig gerundet, in der Basalhälfte fast gerade, die Vorderrandfurche oberseits ganz erloschen, Vorderrand der Vorderbrust mit deutlicher flacher Ausrandung. Halsschildoberseite gross, aber flach gekörnelt, in den Zwischenräumen mit zerstreuten hellen Schüppchen. Flügeldecken grob und etwas runzelig gekörnt, die Streifen oberseits zufolge der Körnung undeutlich an den Seiten deutlich, die Spatien daselbst ebener mit ungleich entfernten glänzend glatten die ganze Breite einnehmenden Körnern, überall zwischen den Körnern mit zahlreichen kleinen Schuppenpunkten. Unterseite mit Ausnahme der letzten 3 Bauchsegmente mit einzelnen zerstreuten Schüppchen und sowie die Beine fein und spärlich weisslich behaart. Hinterschenkel beim ♀ die Decken wenig, beim ♂ deutlich überragend.

(Schluss folgt.)

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(*Dresden, Germany.*)

(*Schluss.*)

4. Subgenus **Orthocyrtus** nov.

Das Merkmal des an der Wurzel nicht vorgewölbten, sondern mit der Stirn ziemlich in einer Flucht verlaufenden oder selbst etwas concaven an der Wurzel jederseits rechtwinkelig abfallenden Rüsselrückens vereinigt eine Reihe recht verschiedenartiger Formen, die später vielleicht noch in drei Gruppen zu sondern sind. Vorläufig wurden der Untergattung, als deren Typus *triangularis* anzusehen ist, alle Arten mit kantigem basalen Rüsselquerschnitt angegliedert, da ihre geringe Zahl ohnedies einen leichten Überblick ermöglicht.

Übersicht der Orthocyrtus-Arten.

a^1. Halsschild glatt, oder zerstreut punktiert, Flügeldecken des ♀ nicht auffallend ausgezeichnet.
  b^1. Halsschild nur mit zerstreuten, oder ganz ohne Schuppen.
    c^1. Flügeldecken kräftig und dicht punktiert, mit vorn goldgrün beschupptem Seitenrand, häufig auch mit wenigen ebensolchen Makeln .... 39. **triangularis** sp. nov.
    c^2. Flügeldecken fein gereiht punktiert, glänzend schwarz. 40. **politus** sp. nov.
  b^2. Halsschild jederseits auf der Scheibe mit Schuppenmakel.
    d^1. Halsschildvorderrand nach unten zu allmälig verschmälert, an der Vorderbrust nicht ausgerandet, Halsschildscheibe jederseits mit rundlicher Schuppenmakel, grösste Halsschildbreite in oder wenig vor der Mitte.

e^1. Schuppenmakeln kupfrig oder grün goldig; sie bestehen auf den Decken aus drei Querreihen von je 2–4 rundlichen und einer längsstreifigen Makel auf der Spitze des 2. Spatiums.
schönherri Waterh.

e^2. Schuppenmakeln kobaltblau, in der 2. Querreihe fehlen die dorsalen Schuppenmakeln, so dass nur eine laterale und eine längliche Marginalmakel vorhanden ist, Apicalmakel nicht streifenartig, sondern rundlich (vielleicht nur Varietät des vorigen).
coruleonotatus Waterh.

d^2. Halsschildvorderrand nach unten zu an den Seiten verbreitert, Vorderbrust deutlich ausgerandet, die Schuppenmakel jederseits auf der Scheibe längs streifenartig, grösste Halsschildbreite nahe dem Vorderrand .... lenis Chevr.

b^3. Halsschild beiderseits mit beschuppter Längslinie.

f^1. Vorder- und Hinterrand des Halsschildes beschuppt, Flügeldecken mit sich rechtwinkelig kreuzenden grünen Schuppenstreifen die 14 Rechtecke, davon 2 nahtständig umschreiben.
quadrulifer Waterh.

f^2. Vorderrand, nicht auch der Hinterrand, des Halsschildes beschuppt, Flügeldecken mit ähnlichen Schuppenstreifen die aber nur 11 Rechtecke, davon 3 nahtständig umschreiben (mir in natura unbekannt) .... subquadrulifer Waterh

b^4. Halsschild kugelig, sowie die Decken dicht goldgrün beschuppt.
41. virens sp. nov.

a^2. Halsschild zwischen den Punkten, dicht und fein runzelig-gekörnt; Flügeldecken des Weibchens im 2. Drittel in eine abgestumpfte Spitze ausgezogen, die die Nahtspitze überragt (Taf. I, Fig. 26a).
tumoridorsum Chevr.

In diese Gruppe gehört wahrscheinlich auch der mir unbekannte (mit *schönherri* verwandte?) .... hopei Waterh.

39. Metapocyrtus (Orthocyrtus) triangularis sp. nov.

Niger, sat nitidus, rostro basi sulcis cruciatis, fronte prothoraceque squamulis paucis viridi-auratis; elytris oblongo-globosis, sat crebre punctatis, margine basali atque laterali maculisque oblongis lateralibus duabus utrinque (interdum deficientibus) ante, duabus aut tribus post medium et una apicali, viridi-aurato-squamosis; pedibus subtiliter parceque albido-setosis, femoribus interdum subrufescentibus.

Long. 13–14, lat. 6.2–7 mm.

Patria: Insulae Philippinae, M. Dr., ex coll. *Kirsch et Dohrn* (Bur. Sci. Acc. No. 11560), M. St., D. E. M., Br. M., c. *Sol.* etc.

Schwarz, ziemlich glänzend, Kopf und Halsschild mit zerstreuten goldig grünen Schüppchen, Flügeldecken an der Wurzel und auf dem Seitenrande, sowie einige (höchstens 10 im ganzen) längliche Makeln goldgrün beschuppt. Rüssel mit bis zur halben Länge nach vorn reichender, tiefer Mittelfurche, an der Wurzel grob, nach der Spitze zu feiner punktiert. Rüsselrücken ziemlich eben, in einer Flucht mit der Stirn verlaufend und von dieser durch eine tiefe Querfurche getrennt. Kopf hinter den Augen fein querstreifig. Fühler mit geschwungenem, in der Apicalhälfte flach gedrücktem Schaft, 1. und 2. Geisselglied verlängert, das 1. etwas länger als das 2., die folgenden kugelig, das letzte quer kugelig. Halsschild breiter als lang, die Seiten gleichmässig gerundet, unregelmässig und ziemlich flach, aber gross punktiert, der abgesetzte Vorderrand meist glatt, der Hinterrand mit Furche. Flügeldecken eiförmig gewölbt, hinten steil abfallend, so dass die Nahtspitze etwas zurückgezogen erscheint, überall mässig dicht gereiht-punktiert, so dass die Punktreihen sich von der Zwischenraumpunktierung nicht abheben, zuweilen tritt der Zwischenraum zwischen der 4. und 5. Punktreihe etwas wulstig vor, oder er ist in der Basalhälfte doch beiderseits durch gerade Punktreihen begrenzt und glatt. Die variable grüne Beschuppung besteht aus einem an der Nahtwurzel unterbrochenen Basal- und die Deckenspitze nicht erreichenden Seitenrandstreifen, sowie in 3 Querreihen von seitenständigen Längsmakeln, je 2 kurze vor, 2–3 hinter der Mitte und je eine neben der Nahtspitze. Häufig ist jedoch sowohl die Vorder- und Seitenrandbeschuppung geschwunden, als auch die Makelanzahl reduziert. Kopf unterhalb der Augen, die Vorderhüften, sowie die Seiten der Vorder-, Mittel- und Hinterbrust goldig grün beschuppt, die Körperunterseite im übrigen sparsam und fein grünlich weiss behaart. Die Schenkel zuweilen rötlich, die hinteren die Deckenspitze nicht überragend. Schienen im Spitzendrittel gebogen, die vorderen am Innenrande scharf, die hinteren undeutlich gedörnelt.

40. **Metapocyrtus (Orthocyrtus) politus** sp. nov.

Aterrimus, nitidus, M. triangulari affinis sed minor, maculis perpaucis, plerumque deficientibus, glauco-squamosis; rostro fortiter, fronte subtiliter parceque punctatis ac in medio sulcatis; prothorace maris subtransverso, feminae distincte transverso, subtiliter remoteque punctato, ad marginem basalem et apicalem sulcato, pone medium plerumque utrinque guttula glauco-squamosa; elytris breviter ovatis, punctulis vix seriatis, lateribus punctis piligeris, ante medium, raro etiam ad marginem lateralem, litura cobaltino-squamosa; corpore subter lateribus, abdomine excepto, plus minusve albido-squamosis; maris femoribus elytris distincte, feminae vix superantibus.

Long. 10–12, lat. 5–6 mm.

Patria: LUZON, M. Dr. ex. coll. *Dämel*, *Kirsch*, *Dohrn*, D. E. M., M. St., Br. M., c. *Sol.* etc.

Eine in den meisten Sammlungen vertretene, schwarze, der hinfälligen wenigen, bläulichen Schuppenmakeln zumeist beraubte Art, vom Habitus des *P. monilifer*. Rüssel mit nach vorn sehr schwach divergierenden Seiten, dicht und ziemlich grob punktiert, mit bis über die Mitte nach vorn hinausreichender, etwas grübchenartig erweiterter Mittelfurche. Stirn glänzend, fein und zerstreut punktiert, die Mittelfurche viel feiner als die des Rüssels. 1. Geisselglied der Fühler länger als das 2., die Glieder vom 4. ab ziemlich perlschnurförmig. Halsschild beim ♂ sehr wenig, beim ♀ deutlich breiter als lang, vorn und hinten mit Randfurche, fein und zerstreut punktiert, zuweilen beiderseits hinter der Mitte neben dem Seitenrand mit kleiner, länglicher bläulich beschuppter Makel. Flügeldecken fein und ziemlich entfernt unordentlich gereiht-punktiert, die Punkte namentlich an den Deckenseiten mit je einem feinen, greisen Härchen, Nahtspitzen beim ♀ zu einem sehr kleinen gemeinsamen Höckerchen ausgezogen, beim ♂ im flachen Bogen gemeinsam abgerundet. In der Mitte der Decken zuweilen mit einer bläulichen länglichen Schuppenmakel oder mit (♀) einer Querreihe von solchen. Unterseite und Beine spärlich und etwas abstehend greis behaart, Seiten der Vorder-, Mittel- und Hinterbrust mit weisslichen Schüppchen. Bauchschienen glänzend, kaum punktiert, nur die 1. in der vorderen Hälfte querstreifig, die letzte beim ♂ ziemlich dicht punktiert, beim ♀ ausserdem in der Spitzenhälfte runzelig querstreifig. Hinterschenkel die Spitze der Decken beim ♂ kaum, beim ♀ deutlich überragend.

41. **Metapocyrtus (Orthocyrtus) virens** sp. nov. (♂, ♀.)

Niger, supra ubique squamulis splendide viridi-auratis tectus; rostro latitudine sesqui longiore, dorso longitudinaliter convexo, basi remote, apicem versus densius punctato, in dimidia parte basali impressione mediana; prothorace globoso, longitudine perpaulo latiore, lateribus aequaliter rotundatis, sat remote punctato; elytris oblongo-ovatis, prothorace latitudine fere aequalibus, sutura in parte declivi seriato-ciliata; corpore subter glabriusculo, parce albido-piloso; maris metasterno segmentoque abdominali primo transverse subrugulosis, feminae segmento anali pone marginem posticum arcuatim substrigoso; pedibus nigris, femoribus anticis intermediis longioribus, posticis in mare fere dimidia parte elytris superantibus.

Long. 9–11.2, lat. 3.5–5 mm.

Patria: LUZON, M. Dr. ex coll. *Kirsch*, legit *Dr. C. Semper*, M. St., D. E. M., ex coll. *Sol.*, ex coll. *Jekel* (*A. smaragdulus* Jekel in litt.), M. Brux. (*A. regalis* Behrens in litt., *A. midas* Dohrn in litt.) et M. Senck.

Diese Art, aller Wahrscheinlichkeit nach der mit Unrecht in Baer's Catalog aufgenommene *Apocyrtus virens* Motsch. in litt., sieht zufolge der goldgrünen Oberseitenbeschuppung täuschend dem *M. bituberosus* m. ähnlich, ist aber durch den anders gebildeten, jedoch in beiden Geschlechtern sehr ähnlichen Rüssel, sowie durch das nicht gekörnte Halsschild und die feinere Kopfskulptur leicht von diesem zu unterscheiden. Rüssel ungefähr 1½ mal so lang wie breit, sein Rücken der Länge nach leicht gewölbt, mässig dicht, in der Spitzenhälfte feiner und dichter punktiert, in der Basalhälfte mit kräftigem Mitteleindruck, seine Seitenkanten parallel, vor den Augen ein Längsfältchen bildend, Rüsselseiten vor den Augen mit glatter Fläche, unterhalb der Seitenkante mit einer nach unten sich flach dreieckig ausbreitenden Längsfurche, unter dem Auge eine längliche Schuppenmakel. Kopf mit glänzendem, vollkommen glatten Scheitel. 1. Geisselglied der Fühler in beiden Geschlechtern länger als das 2. Halsschild sehr wenig breiter als lang, kugelig gewölbt, zerstreut punktiert, der abgesetzte Vorderrand nach oben zu nicht, wie meist bei *bituberosus*, breiter werdend. Flügeldecken gestreckt elliptisch, beim ♂ von Halsschildbreite, beim ♀ mehr oder weniger breiter, verworren punktiert, im abschüssigen Teil der Naht mit gereihten Börstchen. Unterseite kaum beschuppt, sowie die schwarzen Beine mit zerstreuten weisslichen Härchen, Hinterbrust und 1. Bauchsternit des Männchens, wie gewöhnlich, der Länge nach eingedrückt und ausserdem undeutlich querrunzelig. Analsegment des Weibchens längs des Hinterrandes und mehr oder weniger parallel mit diesem verlaufend, mit feinen vertieften Streifen. Hinterschenkel des ♀ sehr wenig, des ♂ fast um die Hälfte die Deckenspitze überragend. (Bei einem offenbar ganz frisch ausgekrochenen Pärchen des Senckenbergischen Museums mit verbeulten aber brillant beschuppten Decken sind die Beine gelbbraun.)

Sehr wahrscheinlich ist diese Art dieselbe, die Motschulsky[18] in einem Brief erwähnt, aber nicht beschreibt.

5. Subgenus Metapocyrtus s. str.

(Rüsselrücken mit ganz abgerundeten Seitenkanten.)

a^1. Halsschild nicht gekörnelt, nicht oder nur fein und zerstreut punktiert.

- b^1. Rüsselseiten vor dem Auge ohne furchenartigen Längseindruck. Halsschild ohne Mittelfurche, Mittelfurche des Rüssels vorn nicht verbreitert, Flügeldecken des Weibchens mit anteapicalen Suturaltuberkel und in eine nach oben gebogene Spitze ausegezogen.
  42. repandicauda sp. nov.

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[18] *Bull Soc. Mosc.* (1861), 1, 628.

b². Rüsselseiten vor dem Auge mit furchenartigem Längseindruck, Halsschild mit Mittelfurche.

c¹. Längseindruck an den Rüsselseiten vorn so tief wie die Fühlerfurche und unter einem Winkel von circa 45° in diese einmündend, Basalrand der Decken nicht oder undeutlich erhaben.

d. Flügeldecken an der Wurzel je mit 8–10 abwechselnd längeren und kürzeren haarfeinen weisslichen Schuppenlinien die am Basalrand durch keinen Schuppenstreifen verbunden sind.

43. interruptolineatus sp. nov.

d². Flügeldecken an der Wurzel höchstens mit 4 an Länge wenig verschiedenen längs des Basalrandes mit einander mehr oder weniger verbundenen bläulich grünen Schuppenstreifen oder nur neben der Naht und innerhalb der Vorderecken mit einem kleinen bläulichen Schuppenpunkt (var. *pictus*.)

44. pseudomonilifer sp. nov.

c². Längseindruck an den Rüsselseiten viel seichter wie die Fühlerfurche, in diese nicht einmündend, sondern von ihr durch eine feine Leiste geschieden.

e¹. Basalrand fein aber scharf leistenartig gerandet, Stirn zwischen den Augen so lang wie breit, mässig eingedrückt.

f¹. Flügeldecken mit eingedrückten Längsstreifen, ganz unbeschuppt, matt, wenig breiter als das in der Mitte ungefurchte Halsschild .... 45. cylas sp. nov.

f². Flügeldecken ohne eingedrückte Längsstreifen, teilweise beschuppt und deutlich breiter als das in der Mitte gefurchte Halsschild .... 46. scabiosus sp. nov.

e². Basalrand der Flügeldecken nicht leistenartig erhaben, Stirn zwischen den Augen viel länger als breit, tief, im Querschnitt winkelig, eingedrückt, Flügeldecken ganz unbeschuppt.

47. politissimus sp. nov.

a² Halsschild oberseits gekörnelt, höchstens beim Weibchen zuweilen ein Längsstreifen in der Mitte geglättet, oder selten, grob punktiert.

g¹ Halsschild ganz ohne Schuppenmakeln und Schuppenstreifen oder entweder überall mässig dicht oder gar nicht beschuppt, Flügeldecken höchstens an der Wurzel und in der Mitte mit feinem Schuppenquerband in der Regel nicht, selten längsstreifig beschuppt.

h¹. Halsschildvorderrand an den Seiten unterhalb des Auges plötzlich recht- oder spitzwinkelig abgebrochen, eine grosse scharfe Ecke bildend, Halsschild des ♂ deutlich, des ♀ nicht breiter als die Decken, bei letzterem an der Spitze, in der Verlängerung des 2. Punktstreifens mit einem konischen etwas nach unten gerichteten Dorn bewährt, Rüssel des ♂ oberseits ganz abgeplattet, nach der Wurzel zu verschmälert, der des ♀ gewölbt an der Wurzel höckerig abgesetzt, die breite Basalfurche grubig auf die Seiten herabziehend (*granifer* Chevr., *femoralis* Chevr.).

rufipes Waterh.

h². Halsschildvorderrand, wenn überhaupt, dann nur allmälig seine Breite ändernd.

i¹. Halsschildvorderrand entlang der Vorderbrust stark verschmälert, kaum ein Drittel so breit wie unterhalb des Auges.

*j*¹. Rüsselrücken dicht runzelig punktiert, mit tief eingedrückter Mittelfurche, Stirn zwischen den Augen so lang wie breit, mit vorn stark vertiefter Mittelfurche, Flügeldecken undeutlich doppelreihig punktiert, mit Andeutung glatter Spatien, Halsschild des ♂ auf der Scheibe ganz abgeschliffen gekörnt, das des ♀ in Umriss ungefähr gleichseitig 6-eckig, dicht gekörnelt mit glattem Mittelstreifen, die Flügeldecken bei letzterem erwähntem Geschlecht an der Spitze gemeinsam ausgezogen.
48. bambalio sp. nov.

*j*². Rüsselrücken mässig punktiert, zuweilen nur an der Wurzel oder ganz ohne Mittelfurche, Stirn zwischen den Augen beim ♂ deutlich länger als breit, sanft gewölbt mit feiner Mittelfurche, Halsschild in beiden Geschlechtern kräftig gekörnt, Flügeldecken ziemlich dicht, kaum gereiht-punktiert, die Zwischenräume fein querrunzelig, die des ♀ in eine stumpfe gemeinsame Spitze ausgezogen (*longipes* Chevr.).... **impius Er.**

*i*². Halsschildvorderrand längs der Vorderbrust nur unmerklich schmäler.

*k*¹. Halsschild in beiden Geschlechtern breiter als lang, ohne Mittelfurche, sehr dicht und fein gekörnt, die Körnchen ungleich und runzelig, Decken des ♂ mit leicht eingedrückten Doppelpunktreihen, am Basalrand schmal beschuppt, beim ♀ ausserdem mit einer mittleren Querbinde und im 2. Drittel mit kräftigen Suturalhöcker, den die vorgezogene Nahtspitze hinten nur wenig überragt.................................. **brevicollis Chevr.**

*k*². Halsschild so lang, oder länger als breit.

*l*¹. Halsschild gekörnt, mit Mittelfurche.

*m*¹. Halsschild so lang wie breit, kugelig, beim ♂ breiter als die Flügeldecken, diese fein und kaum gereiht-punktiert, zuweilen hie und da mit unscheinbaren bläulichen Schüppchenschwärmen. Dorsalwülste des Rüsselrückens nach der Wurzel zu convergierend. Äusserste Deckenspitze beim ♀ in gemeinsamen kurzen Bogen ausgerandet.
derasus Boh.

*m*². Halsschild länger als breit, Flügeldecken kräftig punktiert, die Zwischenräume in der Spitzenhälfte neben der Naht etwas runzelig, in der Mitte mit einer, die Naht nicht erreichender schmalen Querbinde und zu Beginn des Spitzendrittels mit zerstreutem querbandartig angeordnetem Schwarm von grünlichen Schüppchen. Dorsalwülste des Rüsselrückens parallel.
49. macgregori sp. nov.

*l*². Halsschild grob punktiert, die Punkte häufig zu je zweien und dreien zusammenfliessend, in der Mitte der vorderen Halsschildhälfte einzeln und sparsamer, jeder Punkt mit feinen Härchen, der Halsschildvorderrand und die hintere Hälfte des Halsschildes, ausgenommen in der Mitte, mit spärlichen weissen Schüppchen. Flügeldecken regelmässig punktiert gestreift, die Streifen mit weisslichen Schüppchen bekleidet.
50. striatus sp. nov.

g^2. Halsschild jederseits mit Schuppenmakel oder Schuppenlinie, oder ganz dicht beschuppt.

n^1. Halsschild in der Mitte mit einer in der Mittellinie häufig unterbrochenen Schuppenquerlinie, oder jederseits mit Schuppenmakel (nie in der Mittellinie mit beschupptem Längsstreifen).

o^1. Rüssel unterseits in beiden Geschlechtern hinter dem Kinnausschnitt mit einem kräftigen nach hinten gerichteten konischen Zapfen (Taf. I, Fig. 9 u. 10), Flügeldecken kurz eiförmig.

p^1. Halsschild runzelig feinkörnig mit einer in der Mitte zuweilen (♀) unterbrochenen bläulich beschuppten Querbinde ebenso die Decken an der Wurzel, in der Mitte und vor der Spitze mit je einer kobaltblauen die Naht nicht erreichenden Querbinde, Deckenspitze selbst mit einzelnen blauen Schüppchen. picipennis Waterh.

p^2. Halsschild grob punktiert, die Zwischenräume runzelig, kaum gekörnt, in der Mitte der Scheibe mit undeutlichem Längseindruck, der Vorderrand und jederseits innerhalb des Seitenrandes in der Mitte eine Punktmakel, der Seitenrand der Decken und mit ihm ein Längsstreifen im 1. Drittel des 2. Spatiums, eine geschwungene Querbinde hinter der Mitte, und mehrere Apicalmakeln weiss beschuppt. 51. **albodecoratus** sp. nov.

o^2. Rüssel unterseits vor der Spitze ohne Zapfenbewehrung.

q^1. Halsschild ohne beschuppte Querlinie in der Mitte, nur jederseits in der Basalhälfte innerhalb des Seitenrandes mit Schuppenstreifen, Rüsselseiten mit tiefer in die Fühlergrube mündender Furche, Halsschild etwas runzelig abgeschliffen gekörnt mit Mittelfurche, Flügeldecken fein, etwas unregelmässig gereiht punktiert mit zahlreichen ungefähr 5 Querreihen bildenden Schuppenpunkten. Nahtspitze beim ♀ etwas gewulstet und in eine etwas nach unten gekrümmte, stumpfe Spitze ausgezogen. 52. **tenuipes** sp. nov.

q^2. Halsschild mit beschuppter, in der Mitte unterbrochener, Querlinie, die sich innen nach hinten umbiegt und den Halsschildhinterrand gegenüber der Wurzel des 2. Deckenspatiums erreicht, Halsschild in beiden Geschlechtern, auch in der Mitte punktiert, Flügeldecken des ♀ hinter der 3. Querbinde mit undeutlichem Suturaltuberkel, Nahtspitze etwas wulstartig vortretend .... 53. **picticollis** sp. nov.

q^3. Halsschild entweder mit zuweilen in der Mitte unterbrochener Schuppenquerlinie die aber in letzterem Fall niemals innen bogenartig nach dem Halsschildhinterrand verlängert ist, oder jederseits mit Schuppenquermakel.

r^1. Rüsselseiten vor dem Auge ganz ohne Längseindruck, Rüssel des Männchens mit abgeplattetem Rücken, der des Weibchens an der Wurzel etwas höckerig abgesetzt, Basalfurche auf die Seiten herabziehend, Halsschild runzelig gekörnt, mit feiner Mittelfurche, Decken mit 2–3 Querreihen von je 2–3 Makeln, die des ♀ im 2. Drittel mit beborstetem Sutural-

tuberkel und an der Nahtspitze in 2 kurze konische Zapfen ausgezogen die dicht aneinander gepresst stehen.
54. **difficilis sp. nov.**

r^2. Rüsselseiten vor dem Auge immer mit tiefem Längseindruck.

s^1. Flügeldecken längsstreifig beschuppt, Halsschild querrunzelig, körnig, ohne Mittelfurche vor dem Hinterrand geglättet .... 55. **virgatus sp. nov.**

s^2. Flügeldecken querbandartig beschuppt.

t^1. Halsschild punktiert, ohne Mittelfurche.

u^1. Halsschild quer an den Seiten stark gerundet, auf der Scheibe nicht runzelig sondern einfach und sparsamer als nach den Rändern zu punktiert. Querbänder der Decken durch einen breiten marginalen Schuppenstreifen mit einander verbunden, Rüsselrücken des ♀ an der Wurzel stark höckerartig vortretend, Basalquerfurche, die jederseits vor dem Auge befindlichen tiefen viereckigen Gruben mit einander verbindend (*gibbirostris* Waterh.).
erichsoni Chevr.

u^2. Halsschild leicht quer, die Seiten wenig gerundet, die grösste Breite etwas vor der Mitte, die Scheibe runzelig punktiert, die Deckenquerbänder durch keinen marginalen Schuppenstreifen mit einander verbunden, Rüssel des ♀ einfach, ihre Decken an der Spitze des Seitenrandes kurz ausgerandet.
56. **puncticollis sp. nov.**

t^2. Halsschild beim ♂ abgeschliffen gekörnt, beim ♀ scharf gekörnt mit elliptischer glatter Mittelfläche, in beiden Geschlechtern mit feiner Mittelfurche, Flügeldecken des ♀ in eine gemeinsame kurze, depresse Spitze ausgezogen .... 57. **dolosus sp. nov.**

n^2. Halsschild in der hinteren Hälfte mit einer die Hinterecken ausfüllenden grossen Schuppenmakel, oder ganz beschuppt, auf der Scheibe zuweilen abgerieben.

v^1. Halsschild quer, mit stark und gleichmässig gerundeten Seiten, oberseits grob runzelig punktiert, ohne Mittelfurche, Rüssel des ♀ an der Wurzel höckerig vortretend, die oblongen tiefen Gruben vor den Augen sind durch die Rüsselbasalfurche mit einander verbunden, Deckenspitze gemeinsam kurz ausgerandet, die Nahtspitze etwas schwielig.............................. **rugicollis Chevr.**

v^2. Halsschild leicht quer oder so lang wie breit, oberseits gekörnt.

w^1. Halsschild nur in den Hinterecken mit Schuppenmakel in der Mittellinie, namentlich vorn, mit Andeutung einer Längsfurche, Flügeldecken mit je 2 bis 3 in drei geraden Querreihen angeordneten ziemlich viereckigen Schuppenmakeln und einer einzelnen Spitzenmakel. Rüssel des ♀ an der Wurzel höckerig abgesetzt, sein Rücken eine in der Mitte leicht grubig eingedrückte ebene Fläche bildend, deren Seiten infolge einer tiefen geschwungenen Furche, die von der Basalfurche nach der Fühlerwurzel zieht, gewulstet erscheinen.
elegans Waterh.

w^2. Halsschild ganz oder grösstenteils beschuppt.

x^1. Rüssel unterseits in beiden Geschlechtern, ungefähr unter dem hinteren Ende der Fühlerfurche, mit nach hinten gerichtetem Zapfen. Käfer ganz goldgrün beschuppt mit ungefurchtem Halsschild, bei deflorierten Exemplaren bilden die abgeriebenen Stellen auf den Decken häufig 2 breite schwarze Querbinden. Rüssel des ♀ an der Wurzel in Form eines stumpfen Doppelhöckers abgesetzt, ihre Deckenspitze wie bei *M. dolosus* in eine gemeinsame stumpfe Spitze ausgezogen .... **58. bituberosus** sp. nov.

x^2. Rüssel untersiets ohne Zapfenbewehrung, Halsschild mit Mittelfurche, Basalfurche des Rüssels jederseits in Form einer fast rechtwinkelig auf die Fühlerfurche stossenden Längsgrube auf die Rüsselseiten herabziehend. Käfer grünlich golden beschuppt, Halsschildscheibe und die Mitte der Decken (in Form einer x-förmigen Makel) bei den mir vorliegenden 2 Stücken (♂, ♀) abgerieben. ? **opulentus** Chevr.

n^3. Halsschild in der Mittellinie, zuweilen nur an der Basis, mit Längsschuppenmakel oder Streifen.

y^1. Flügeldecken mit beschuppten Längs- und Querlinien, Halsschild kräftig gekörnt, jederseits mit vorn abgekürzter, in der Mitte mit einer mit dem beschuppten Vorderrand verbundenen Schuppenlinie .... **59. figuratus** sp. nov.

y^2. Flügeldecken ohne beschuppte Längslinien, sondern mit 3 Querreihen mehr oder weniger zusammenfliessender Makeln, Halsschild beim ♂ abgeschliffen, beim ♀ kräftiger gekörnt, an der Basis in der Mitte mit streifenartig vor den Hinterecken mit rundlicher Schuppenmakel, Deckenspitzen beim ♀ sehr wenig und stumpf gemeinsam vorgezogen .... **subfasciatus** Waterh.

42. **Metapocyrtus repandicauda** sp. nov. (♂, ♀.)

Rufus, elytris nigris, crebre malachitico-squamosis, rostro dorso sulco mediano, antennis funiculi articulo ultimo oblongo-elliptico; prothorace basi apiceque sulco marginali, squamulis malachiticis perpaucis adsperso; elytris ellipticis, remote punctatis, feminae ad suturam in secundo triente tuberculo obtuso parce piloso, apice acuminatis ac incurvatis, maris simplicibus; pedibus rufis parce albopilosis.

Long. (sine capite) 7–7.5, lat. 3.2 mm.

Patria: LUZON, provincia Benguet, mons Pulog, legit *H. M. Curran* (Bur. Sci. Acc. No. 10267).

Gelbrot, Flügeldecken schwarz, dicht mit malachitgrünen Schüppchen bedeckt. Rüssel wenig länger als breit, mit breiter Mittelfurche, sowie die Stirn mit einzelnen runden, grünen Schüppchen in den zerstreuten Punkten und dazwischen mit spärlichen greisen Härchen. 1. und 2. Geisselglied verlängert, ersteres länger als das 2., das 3. kurz kegelförmig, die folgenden perlschnurförmig. Halsschild breiter als lang, am Vorder- und

Hinterrande mit Randfurche, die vordere mit gereihten Punkten, glänzend gelbrot mit sehr vereinzelten grünen Schüppchen. Flügeldecken gestreckt elliptisch, schwarz, schwach runzelig mit undeutlichen Reihen entfernter Punkte und mit kleinen runden Schüppchen bedeckt. Basalrand nur an den Seiten etwas abgesetzt, die Nahtwurzel undeutlich gewulstet. Beim Männchen sind die Decken von gewöhnlicher Bildung, beim Weibchen jedoch sind sie vor der Spitzenabschrägung an der Naht in Form eines schwarzen, fein behaarten Höckers aufgetrieben und die Spitze jeder einzelnen ist in einen rötlichen nach ein- und aufwärts gekrümmten Dorn ausgezogen. Unterseite gelbrot, sparsam grau behaart, mit einzelnen grünen Schüppchen, nur eine Längslinie unterhalb des Halsschildseitenrandes und die Seiten der Hinterbrust dichter behaart. Schenkel schlank, die hinteren beim ♂ die Deckenspitzen, beim ♀ die Wurzel des Nahtdornes erreichend, alle an der Spitze, aussen und innen, mit einem kleinen dunklen Fleck. Vorderschienen in beiden Geschlechtern im vorderen Drittel, nach innen gebogen, am Innenrand fein und entfernt gekörnelt.

43. **Metapocyrtus interruptolineatus** sp. nov.

Aterrimus, nitidus, elytris basi apiceque lineolis abbreviatis, basi alternatis longioribus, albido-squamosis; rostro ruguloso-punctato, dorso ut fronte sulco mediano tenui et carinis duabus antrorsum divergentibus obsoletis, fronte subtiliter remoteque punctata, in parte anteriore squamulus parcis albidis; prothorace globoso, indistincte punctato, ad marginem anticum et posticum et in linea mediana sulcato; elytris subtilissime remoteque subseriatim punctatis, striis duabus exterioribus in parte apicali seriatis ac subimpressis; corpore subter in abdomine sat fortiter crebreque punctato ac griseo-piloso, lateribus pro-, meso- et metasterni squamulis perpaucis albescentibus, femoribus posticis maris elytris paulo superantibus.

Long. 10–11.5, lat. 5–5.8 mm.

Patria: Insulae Philippinae, M. Dr. No. 1662, et Br. M. ex coll. *Bowring*.

Eine durch die feinen, abwechselnd kürzeren und längeren hellen Schuppenlinien an der Deckenwurzel auffällige Form vom *Pachyrrhynchus monilifer*-Habitus. Rüssel 1½ mal so lang wie breit, etwas runzelig punktiert, der Rücken mit kurzer, vorn zu flacher, länglicher Grube erweiterten Mittelfurche und 2 vorn divergierenden schwachen Längswülsten, vor den Augen mit tiefer, mit der Fühlerfurche vereinigter Längsfurche, Stirn zerstreut punktiert, vorn mit einzelnen weisslichen Schüppchen.

1. Geisselglied der Fühler etwas länger als das 2., letztes kugelig quer. Halsschild kugelig, so lang wie breit, mit feiner, zuweilen hinten abgekürzter Mittelfurche, im übrigen kaum wahrnehmbar zerstreut, über den Vorderhüften deutlicher punktiert, Vorder- und Hinterrand durch eine Furche breit abgesetzt, in der Basalhälfte, innerhalb des Seitenrandes, mit einer feinen, zuweilen ganz fehlenden Längslinie aus weisslichen Schüppchen. Flügeldecken unordentlich und entfernt gereiht, die 2 äussersten Streifen etwas regelmässiger punktiert und in der hinteren Hälfte etwas eingedrückt. Die abwechselnden Zwischenräume an der Deckenwurzel mit längeren (von $\frac{1}{2}$ oder $\frac{1}{3}$ Halsschildlänge) die dazwischenliegenden mit kürzeren, fast punktförmigen weisslichen Schuppenstrichelchen. Auch an der Deckenspitze finden sich längere und kürzere feine Schuppenlinien, doch wechseln sie nicht regelmässig mit einander ab; die längste nimmt die Spitzenhälfte des 2. Spatiums ein und biegt vor der Spitze auf das vorletzte Spatium nach vorn um, um sich bis zur Mitte oder selbst bis zur Deckenwurzel nach vorn zu erstrecken. Zwischen den Ästen dieser parabolischen Linie finden sich an den Enden der Spatien ungefähr 5 mehr oder weniger lange Schuppenstrichelchen. Zuweilen zeigt das erste Deckenspatium in der halben Länge ein weissbeschupptes Querstrichelchen. Hinterbrust und Hinterleib dicht und grob gekörnt punktiert und fein abstehend behaart, das Analsegment etwas querrunzelig. Hinterschenkel die Deckenspitze etwas überragend.

44. **Metapocyrtus pseudomonilifer** sp. nov.

Pachyrrhyncho monilifero simillimus, niger, rostro crebre subruguloso-punctato, antrorsum perpaulo dilatato, dorso parum convexo, sulco mediano in fronte continuato, carinis duabus antrorsum divergentibus, obtusis, sulco anteoculari profundo cum scrobe confluente; prothorace remote punctato, linea mediana impressa, margine antico maculisque duabus lateralibus in dimidia parte basali, glauco- aut chloro-squamosis; elytris confuse seriato-punctatis, linea mediana transversa, interdum in punctis disoluta, ad basin punctis aut lineolis, duabus dorsalibus plerumque longioribus vittaque in spatii secundi triente apicali, apice per spatium paenultimum antrorsum curvata et puncta dua (vel una vel deficiente) subapicalia, circumscribente; corpore subter metasterni lateribus femoribusque ante apicem interdum segmento secundo in medio parce glauco-squamosis, segmento primo transverse strigoso parce setuloso, ultimo fortiter punctato.

Long. 9-12, lat. 4-5.5 mm.

Patria: LUZON, M. Dr., M. St., D. E. M., Br. M., legerunt *Dr. C. Semper*, et *Cuming* (*Apocyrtus pictus* Waterh. in litt., *Apocyrtus pachyrrhynchoides* Behrens in litt., *Pachyrrhynchus plebejus* Dohrn in litt.).

Eine in Grösse und Ausdehnung der Beschuppung sehr veränderliche, dem *Pachyrrhynchus monilifer* Germ. ausserordentlich ähnliche Art, die vor allem an der tiefen Furche, die von der Fühlerfurche nach dem Auge zieht und letztere spitzwinkelig in 2 gleich tiefe Äste gegabelt erscheinen lässt, zu erkennen ist. Rüssel dicht runzelig punktiert, an der Basis mit undeutlicher Mittelfurche und mit 2 nach vorn divergierenden bis über die Fühlerinsertion reichenden Längswülsten. Stirn beiderseits der Länge nach leicht concav, sparsam und fein punktiert mit einzelnen Schüppchen. Fühler rötlich braun, das 1. Geisselglied länger als das 2. Halsschild so lang wie breit, kugelig gewölbt, mässig dicht punktiert mit feiner namentlich in der Mitte vertiefter Mittellinie. Der Vorderrand und eine mit diesem zusammenhängende Längslinie über den Vorderhüften, sowie jederseits an der Basis innerhalb des Seitenrandes ein Strichelchen bläulich weiss beschuppt. Flügeldecken ziemlich verworren punktiert, bei einzelnen Stücken dort wo sich das 2. und 5. Spatium finden würde, mit einer undeutlichen Längsrippe, der Basalrand, häufig auch der vordere, mit ihm zusammenhängende Seitenrand, eine Querlinie in der Deckenmitte und eine Längslinie im Spitzendrittel des 2. Spatiums die zuweilen an der Spitze auf das vorletzte Spatium und nach vorn umbiegt und 1 bis 2 längliche Schuppenpunkte umschliesst, grünlich oder bläulich weiss. Diese Schuppenzeichnung ist bei einzelnen Stücken sehr reduziert, und besteht nur aus einem Strichelchen neben der Nahtwurzel, 2 oder 3 quer gereihten Punkten in der Deckenmitte und 2–3 Pünktchen im Spitzenteil.

Diese Art als Varietät zu dem mir in natura unbekannten *A. hopei* Waterh. zu ziehen, verhinderte mich unter anderen die Angabe, dass letztere 2 grosse *quere* Subapicalflecke besitzt.

45. **Metapocyrtus cylas** sp. nov.

Aterrimus, gracilis, supra esquamosus; rostro crebre subruguloso-punctato, impressione mediana fere usque ad apicem extensa, cum sulco basali, obtuse angulato, conivente; prothorace globoso, longitudine latitudine aequali, subtilissime alutaceo ac sat remote punctato; elytris angustis, prothorace vix latioribus, maxima latitudine post medium, regulariter subpunctato-striatis spatiis convexiusculis; corpore subter parce griseo-setuloso;

femoribus elytrorum apice valde superantibus, tibiis posticis in dimidia parte basali longitudinaliter aciculatis.

Long. 7.5, lat. 2.2 mm.

Patria: Insulae Philippinae, D. E. M., M. Dr.

Eine schlanke schmale Art, von tief schwarzer Färbung mit leicht gefurchten Decken. Rüssel kräftig punktiert mit tiefer, weit nach vorn reichender Mittelfurche, die mit der schwach stumpfwinkelig geknickten Basalfurche zusammenstösst. Rüsselseiten mit flachem dreieckigen Eindruck, so dass der Oberrand der Fühlerfurche und die Seitenkanten in der Rüsselmitte etwas leistenartig vortreten. 1. Glied der Fühlergeissel etwas länger als das 2., die folgenden, vom 3. ab, kurz kegelförmig, an Länge abnehmend, das letzte leicht quer. Halsschild so lang wie breit, kugelig gewölbt, äusserst fein chagriniert, ziemlich dicht erloschen punktiert, hie und da mit einzelnen weisslichen Börstchen. Flügeldecken lang gestreckt elliptisch, fast doppelt so lang wie breit, so breit wie das Halsschild, mit regelmässigen, furchenartig vertieften Punktreihen, die Spatien leicht gewölbt, erster Punktstreifen nicht vertieft, vorn dicht an der Naht stehend, weiter hinten sich von dieser allmälig entfernend, letzter Streifen hinten über dem 2. Bauchsegment tief eingedrückt, dahinter in 2 Streifen sich teilend. Unterseite spärlich weiss beborstet, die stark gekeulten Schenkel die Deckenspitze fast mit ihrer Hälfte überragend. Hinterschienen in ihrer Basalhälfte auf dem Rücken und an den Seiten längsstreifig.

46. **Metapocyrtus scabiosus** sp. nov. (♂, ♀.)

Niger, prothorace, antennis femoribusque interdum rufescentibus, rostro latitudine longiore, in parte basali ruguloso, subcylindrico; prothorace globoso, despumato-granuloso, interdum fere levi, sulco mediano; elytris prothorace vix latioribus, ovatis, dorso depressiusculis, apice in mare fere truncato-declivibus ac parce fulvo pilosis, irregulariter, striis duabus extremis seriatim punctatis, squamulis sat magnis, rotundatis, ochraceis, in regione scutellari et pone suturam plerumque viridibus, partim tectis, interdum omnius destitutis; corpore subter sat nitido, parce subpunctato, maris segmento anali transverse ruguloso, feminae basi in medio fossa rotundata; femoribus clavatis, maris elytrorum apice paulo, feminae haud superantibus.

Long. 7-9, lat. 2.5-4 mm.

Patria: LUZON, provincia Benguet, Pauai, legit *R. C. McGregor* (Bur. Sci. Acc. No. 11365), et sine origine exacta D. E. M., et M. Dr.

Schwarz, Halsschild, Fühler und Beine zuweilen rötlichbraun.

Rüssel länger als breit, nach vorn zu wenig verbreitert, in der Basalhälfte runzelig, in der Apikalhälfte fein punktiert, Basalquerfurche mässig tief, Seitenkanten ganz verrundet. 1. Glied der Fühlergeissel länger als das 2., die übrigen perlschnurförmig. Halsschild kugelig gewölbt, wenig schmäler als die Flügeldecken, ganz abgeschliffen gekörnelt, fast netzförmig skulpiert, in der Mittellinie mit feiner Furche, an den Seiten von einigen zerstreuten Punkten abgesehen, glatt. Flügeldecken eiförmig, auf dem Rücken etwas flach gedrückt, beim ♂ hinten steil (fast rechtwinkelig verrundet), beim ♀ allmälig abfallend und gelblich bewimpert, nur die äussersten 2 Deckenstreifen regelmässig gereiht, sonst unregelmässig punktiert und nur teilweise mit rundlichen lehmfarbigen, an der Deckenwurzel und Naht häufig grünlichen Schüppchen mässig dicht bedeckt und zwar ist die Beschuppung gewöhnlich nur an den Deckenseiten und in Form einer mit diesen im Zusammenhang stehenden Discalmakel sowie längs der Naht erhalten. Unterseite glänzend schwarz, sparsam und fein behaart, nur die Vorderbrust an den Seiten, über den Hüften zuweilen mit einzelnen weissen Schüppchen. Schenkel stark gekeult, die hinteren beim ♂ die Decken etwas überragend.

47. **Metapocyrtus politissimus** sp. nov. (Taf. II, Fig. 16.)

Niger, glaber, nitidissimus, prothorace, femoribus basi tibiisque rufis; rostro crebre ruguloso-punctato; oculis subapproximatis prothorace sphaerico, sulco mediano tenui, basi apiceque marginatis; elytris oblongo-ovatis, subtiliter seriato-punctatis; pedibus parce griseo-pilosis.

Long. (sine capite) 6-6.5, lat. 2.3-2.5 mm.

Patria: LUZON, provincia Benguet, mons Pulog, legit *H. M. Curran* (Bur. Sci. Acc. No. 10273).

Glänzend schwarz, das Halsschild, die Wurzel aller Schenkel und die ganzen Schienen, sowie die Fühler mit Ausnahme der Keule rot. Rüssel doppelt so lang wie breit, dicht runzelig punktiert. Augen mehr als bei anderen Arten genähert, die Stirn zwischen ihnen viel schmäler als der kleinste Durchmesser eines Auges, mit tiefer Mittelfurche, Scheitel unpunktiert. Fühlerschaft geschwungen, den Halsschildvorderrand erreichend, 1. Geisselglied länger als das 2., diese beiden so lang wie die 5 folgenden, kugeligen, unter einander gleich grossen, zusammengenommen, Keule gestreckt-elliptisch, grau tomentiert. Halsschild kugelig am Vorder- und Hinterrande mit einem, durch eine Furche abgesetzten Saum, kaum wahrnehmbar fein und zerstreut punktiert, mit feiner Mittelfurche. Flügeldecken gestreckt eiförmig mit Reihen entfernter feiner Punkte, die äusserste Punktreihe kräftiger. Vorder- und Mittelschenkel im Basaldrittel, die hintern bis zur Hälfte, die ganzen Schienen und mehr oder weniger auch die ersten 2 Tarsenglieder rot. Die ganzen Beine fein zerstreut grau bewimpert.

In der Sammlung des Herrn Desbrochers de Loges in Tours befindet sich eine Abänderung mit ganz schwarzen Beinen.

48. **Metapocyrtus bambalio** sp. nov. (♂, ♀, Taf. I, Fig. 27 u. 27a.)

Piceus, squamulis perminutis albidis aut viridescentibus parce tectus, pedibus antennisque subrufescentibus; rostro crebre ruguloso-punctato; impressione mediana, fronte inter oculos latitudine longitudine aequali; prothorace globoso, margine antico subter fortiter angustato, in mare ruguloso-punctato, in femina lateribus subangulose ampliatis, subtiliter granuloso, vitta mediana levi; elytris irregulariter punctatis, squamulis parcis ante apicem subfasciatim condensatis, in femina apice obtuse productis; femoribus posticis maris elytris distincte, feminae haud superantibus.

Long. 8.5–10, lat. 4 mm.

Patria: Insulae Philippinae, M. Dr. ex coll. *Faust* (*A. bambalio* Dohrn in litt.).

Schwarz, spärlich mit weisslichen, zuweilen etwas grünlichen Schüppchen bedeckt. Rüssel 1½ mal so lang wie breit, ziemlich grob und dicht punktiert, der mediane Rückeneindruck nach vorn verbreitert bis zwischen die Fühlerinsertion nach vorn reichend. Stirn mit bis hinter die Augen reichender eingedrückter Mittellinie. Halsschild des ♂ etwas länger als breit, seine grösste Breite etwas hinter der Mitte, mässig dicht punktiert, die Zwischenräume undeutlich gerunzelt, in der Mitte der Scheibe mit eingedrückter Längslinie ringsum mit zerstreuten äusserst kleinen runden Schüppchen, das des ♀ breiter als lang, an den Seiten stumpfwinkelig erweitert, so dass seine Peripherie einem regulären Sechseck nahe kommt, seine Oberseite flach gekörnelt, Mitte der Scheibe mit breitem geglättetem Mittelstrich. Flügeldecken gestreckt elliptisch, nur so breit wie das Halsschild, unregelmässig gereiht-punktiert und spärlich beschuppt, die Schuppen rund und nicht grösser als die Punkte, Nahtende beim ♀ in eine horizontale gemeinsame Spitze ausgezogen (Taf. I, Fig. 27a) und fein etwas abstehend behaart. Beine rötlich, spärlich und kurz weisslich, oder grünlich beborstet, die Hinterschenkel des Männchens die Deckenspitze deutlich überragend, die des Weibchens diese bei weitem nicht erreichend. Analsternit des ♀ etwas länger als an der Wurzel breit, ziemlich grob zerstreut punktiert, beiderseits an der Wurzel, innerhalb des Seitenrandes, breit und flach eingedrückt, das des ♂ breiter als lang, gröber und dichter punktiert.

49. **Metapocyrtus macgregori** sp. nov. (♂, ♀.)

Niger, elytris fascia mediana tenui, ad suturam interrupta, basi apiceque parce viridi-squamosis; rostro latitudine sesqui longiore, dorso subtrisulcato, ante oculos sulco laterali profundo in scrobe influente, area infraoculari glabra; prothorace latitudine longiore, globoso, disco crebe granuloso, lateribus leviusculis, linea mediana impressa, margine antico sat dense, ad angulos posticos parce squamoso; elytris ellipticis, maris prothorace vix, feminae paulo latioribus, punctis subseriatis, setuligeris; corpore subter leviusculo, metasterno lateribus viridi-squamosis, maris segmento prino in medio transverse subruguloso, ultimo crebre ruguloso-punctato, feminae segmento ultimo indistincte punctato, apice sinuato ac secundum marginem posticum vage lateque impresso; femoribus posticis in mare elytris paulo, in femina haud superantibus.

Long. 11–12, lat. 4.8 mm.

Patria: CALAYAN, legit *R. C. McGregor* (Bur. Sci. Acc. No. 703).

Der grünen Schuppenzeichnung nach erinnert die Art an *M. acutipennis* Waterh.; das relativ lange Halsschild aber, sowie die tiefe, mit der Fühlerfurche zusammenfliessende Seitenfurche des Rüssels lassen leicht die Verschiedenheit der beiden Arten erkennen.

Schwarz, wenig glänzend, Rüssel 1½ mal so lang wie breit, kräftig, nach der Spitze zu feiner punktiert, die Punkte mit quer gestellten Börstchen, der Rücken mit weit über die Mitte hinausreichender Mittel- und jederseits mit eben so langer, aber breiter Dorsalfurche, Rüsselseiten mit sehr tiefer, vom vordersten Augenpunkt parallel zu den Rüsselseitenkanten nach der Fühlerfurche ziehender und in diese einmündender Furche. Stirn zwischen den Augen so lang wie breit, entfernt punktiert, und mit einzelnen Schüppchen. 1. Glied der Fühlergeissel deutlich länger als das 2., die übrigen kugelig. Halsschild länger als breit, oberseits dicht gekörnelt, an den Seiten fast ganz glatt, mit feiner vertiefter Mittellinie, auf dem unterseits viel schmäleren Vorderrand über den Vorderhüften und beiderseits innerhalb der Hinterecken mit spärlichen grünlichen Schüppchen. Flügeldecken beim Männchen kaum, beim Weibchen etwas breiter als das Halsschild, verworren punktiert, nur die 2 äussersten Streifen in der Spitzenhälfte deutlich gereiht-punktiert, in der Mitte mit einer an der Naht breit unterbrochenen Querbinde von Schienenbreite, die Deckenwurzel und einige, eine unterbrochene Anteapicalbinde und eine Apicalmakel andeutenden Schuppenpunkte blass grün. Unterseite, mit Ausnahme der Hinterbrustseiten unbeschuppt und nur fein zerstreut behaart, das in der Mitte der Länge nach eingedrückte 1. Bauchsternit des Männchens undeutlich querrunzelig, das Analsternit grob punktiert; dieses beim Weibchen an der Spitze ausgerandet und längs des Hinterrandes breit und flach eingedrückt und erloschen punktiert.

50. **Metapocyrtus strictus** sp. nov. (♂.)

Niger, elytris striatim rosaceo-squamosis; rostro rude subruguloso- in parte apicali subtiliter punctato, dorso recto, in dimidia parte basali medio late impresso; lateribus sulco longitudinali profundo; prothorace longitudine latiore, rude punctato, spatiis subrugulosis antice in disco punctis minoribus, margine antico dense, reliquo parce squamosis; elytris sat regulariter seriato-punctatis, striis squamosis, spatiis subcostatis, glabris; corpore subter sat longe parceque albido-piloso, segmento primo in medio dense fulvo-piloso, segmento anali reliquis fortius punctato; femoribus posticis elytris distincte superantibus, tibiis longe pilosis.

Long. 10, lat. 4.8 mm.

Patria: ROMBLON, legit *R. C. McGregor* (Bur. Sci. Acc. No. 1990).

Schwarz, Flügeldecken in den furchenartig vertieften Punktreihen streifenartig rosafarbig beschuppt. Rüssel ungefähr 1½ mal so lang wie breit, sein Rücken gerade und parallelseitig, grob runzelig, in der Spitzenhälfte feiner pnnktiert, in der Basalhälfte mit vorn verbreiterter und verflachter Mittelfurche. Rüsselseiten mit tiefer und brieter parallel zu Seitenkanten venlaufender, vorn sich verjüngernder Längsfurche. Stirn mit vereinzelten Schüppchen und quer gestellten Börstchen. Kopf hinter den Augen mit sehr feinen Querstreifen, unter den Augen mit weissen Schuppenbörstchen. Halsschild breiter als lang, die grösste Breite etwas vor der Mitte, etwas runzelig und sehr grob punktiert, die Scheibe nahe dem Vorderrand etwas geglättet, der Vorderrand dicht, im übrigen spärlich beschuppt. Flügeldecken mit feinem erhabenen Basalrand und ziemlich regelmässigen und beschuppten Punktstreifen, die Zwischenräume leicht gewölbt und kahl. Unterseite, mit Ausnahme der spärlich beschuppten Halsschild-, Mittel- und Hinterbrustseiten fein und ziemlich lang abstehend behaart. Beine schwarz, spärlich, die Schienen fein und behaart, die Hinterschenkel die Decken deutlich überragend.

51. **Metapocyrtus albodecoratus** sp. nov. (♂, Taf. II, Fig. 7.)

Aterrimus, opacus, depressiusculus; rostro latitudine longiore, crebre punctato, in dimidia parte basali dorso longitudinaliter ac late impresso et hic, ut fronte, albo-squamosis (maris subter ad apicem (mento) cono recurvo manifesto); prothorace transverso, crebre punctato, lateribus aequaliter rotundatis, margine apicali maculaque utrinque post medium albo-squamosis; elytris breviter ovatis, depressiusculis, maxima parte confuse striato-punctatis, spatio secundo in triente basali, margine laterali (apice excepto) fascia mediana subundulosa, maculisque quatuor apicalibus albo-squamosis; corpore subter transverse substrigoso sat longe subtiliterque griseo-piloso.

Long. 11, lat. 5.5 mm.

Patria: Insulae Philippinae, legit *Dr. A. Schadenberg*, M. Dr. No. 6334.

Matt schwarz, kräftig punktiert, die Decken mit weiss beschuppten Linien und Punktmakeln. Rüssel grob und dicht punktiert, mit breitem, flachen, weiss beschuppten Längseindruck, die Seitenkanten stumpf verrundet, beim ♂ unterseits vor der Spitze mit einem kräftigen nach hinten gebogenen konischen Zapfen (♀ unbekannt). Stirn viel sparsamer und feiner punktiert sowie der Rüssel längs der Mittelfurche sparsam weiss beschuppt. Fühler schwarz, greis behaart, 1. Geisselglied länger als das 2., die folgenden wenig länger als breit, las letzte breiter als lang. Halsschild quer, dicht und grob und etwas runzelig punktiert mit sehr undeutlicher Mittelfurche, sein Vorderrand sowie jederseits hinter der Mitte, innerhalb des Seitenrandes eine kleine Makel weiss beschuppt. Flügeldecken kurz oval (7×5.5 mm.) oberseits flachgedrückt, grob und verworren, neben der Nahtwurzel und der Spitzenteil des ersten Streifens gereihtpunktiert, jeder Punkt auf dem Grunde mit sehr kurzen weisslichen Börstchen. 2. Spatium im basalen Drittel und ein entlang der Deckenwurzel mit ihm verbundener Streifen längs der vorderen 2 Drittel des Seitenrandes, sowie eine geschwungene, hie und da unterbrochene Querlinie in der Deckenmitte, die vom ersten Streifen bis über die Seitenkanten der Decken nach aussen reicht, aber entfernt vom Deckenrand endet und 4 Punktmakeln, im Spitzenteil, von denen die 2 hintereinander neben der Naht stehenden die Neigung zeigen, streifenartig zusammenzufliessen, weiss beschuppt. Unterseite etwas querstreifig, fein und sparsam aber ziemlich lang greis behaart.

Nach Analogie anderer Arten, dürfte dem ♀ dieser Art die Auszeichnung auf der Rüsselunterseite fehlen.

52. **Metapocyrtus tenuipes** sp. nov. (♂, ♀.)

Aterrimus, nitidus, maculis minutis glauco-squamosis; rostro sulco basali, longitudinaliter impresso, utrinque carinula obtusa retro convergenti; prothorace globoso, granuloso aut subgranuloso (♀), sulco mediando, margine antico vittaque utrinque infra angulum posticum glauco-squamosis; elytris oblongo-ovatis, maris vix, feminae prothorace distincte latioribus ac apice subcaudatim productis, seriato-punctatis, maculis circa 22 glaucis, interdum vittiformibus (praesertim marginali, post mediana) ornatis; corpore subter nigro, pro-, meso- et metasterno lateribus glauco-squamosis; abdomine pedibusque parce grisco-pilosis.

Long. 6.5–7.5, lat. 2.5–3 mm.

Patria: LUZON, legit *Dr. A. Schadenberg*, M. Dr. No. 6305.

Eine kleine schwarze, etwas an *Sphenomorpha* erinnernde Art, mit kleinen bläulichen, zum Teil strichförmigen Schuppenmakeln. Rüssel länger als breit, dicht und etwas runzelig punktiert, der Rücken der Länge nach eingedrückt, zuweilen mit 2 undeutlichen nach hinten zu konvergierenden Längswülsten. Stirn mit scharf eingedrückter Mittellinie und sowie der Rüsselrücken mit einigen bläulichen Schüppchen. Fühler bräunlich schwarz, 1. und 2. Geisselglied verlängert, das 1. etwas länger als das 2., dieses so lang wie das 3. und 4. zusammen, die folgenden kurz elliptisch (♀) oder fast kugelig (♂). Halsschild sehr wenig breiter als lang, kugelig gewölbt und mehr oder weniger runzelig, zuweilen etwas gekörnelt punktiert, mit Mittelfurche, jederseits ein von der Basis bis zur Mitte nach vorn reichender Längsstreifen sowie der Halsschildvorderrand bläulich oder grünlich weiss beschuppt. Flügeldecken länglich eiförmig, mit etwas unregelmässigen Punktreihen, von denen die äussersten 2 etwas eingedrückt sind und 3 Querreihen von 3–4 Schuppenmakeln und je einer Apicalmakel, die entweder rundlich und von Augengrösse, oder streifenartig ist; letztere Form zeigen immer die vor und hinter der Hinterhüfte auf dem Seitenrand stehenden, sowie die nächst der Nahtwurzel und Nahtspitze gelegenen während die übrigen Makeln mehr rundlich sind. Decken im Spitzendrittel, besonders auf der Naht mit feinen sparsamen weisslichen Börstchen, in der Schultergegend beim Weibchen mit 3–4 entfernten Körnern. Hinterschenkel des ♂ die abgestumpfte Deckenspitze überragend, die des ♀ die etwas gemeinsam ausgezogenen Deckenspitze eben erreichend.

53. **Metapocyrtus picticollis** sp. nov. (♂, ♀.)

Aterrimus, prothorace margine antico lineaque circum angulos posticos arcuata, elytris margine laterale, fasciis tribus transversis lituraque angulata apicali, chloro-aurato-squamosis; rostro sat crebre punctato, sulco mediano profundo, fronte subtransversa; prothorace maxima latitudine ante medium, sat fortiter crebreque punctato, spatiis vix rugosis; elytris subregulare seriato-punctatis, feminae prothorace distincte latioribus, sutura ante declivitatem macula minuta subtuberculata plerumque squamosa ac albosetosa; pedibus nigris, parce albido-setulosis, femoribus ad apicem parce squamosis, maris distincte, feminae elytris haud superantibus.

Long. 9–10, lat. 3.6–5 mm.

Patria: Insulae Philippinae, M. Dr. ex. coll. *Kirsch* et *Dohrn*, Br. M., M. L., etc.

Schwarz, mit etwas goldig grünlichen Schuppenlinien. Rüsselrücken parallelseitig, ziemlich fein und dicht punktiert, die Punkte mit einem der Mittellinie zugekehrtem Härchen, jene ziemlich tief, aber nicht scharf ausgeprägt, weit nach vorn reichend. Basaler Quereindruck tief, die Seitenkante nicht erreichend. Stirn beim ♂ so lang wie breit, beim ♀ quer, mit feiner bis zur Breite des Augenhinterrandes nach hinten reichenden Mittelfurche. Fühler schwarz, das 1. Geisselglied länger als das 2., dieses so lang wie die 3 folgenden, das letzte etwas länger als breit. Halsschild sehr wenig breiter als lang, seine grösste Breite vor der Mitte, ziemlich gross aber seicht, an den Seiten spärlich punktiert, jeder Punkt mit feinen kurzen Härchen, Vorderrand des Halsschildes, ein breiter Längsstreifen über den Hüften und eine mit diesen zusammenhängende, die Hinterecken umkreisende und bis auf den Hinterrand reichende Bogenlinie, grünlich golden beschuppt. Diese Bogenlinie die bei Betrachtung des Käfers von oben, von der Mitte des Halsschildseitenrandes nach der Mitte der Deckenwurzel zieht ist, da sie bei keiner anderen Art vorkommt, für diese sehr charakteristisch. Flügeldecken ziemlich regelmässig gereiht-punktiert, beim ♀ je 2 Punktreihen einander etwas mehr genähert, ihr Seitenrand und mit diesem zusammenhängend 3 Querbinden, eine basale, eine kurz vor und eine hinter der Mitte, die an der Naht kurz unterbrochen sind, sowie die winkelig mit dem Marginalstreifen verbundene Spitze des 2. Spatium grünlich golden beschuppt. Die basale Querbinde ist gewöhnlich auf dem 2. und 5. Spatium etwas streifenartig nach hinten ausgezogen, die übrigen Querbinden zuweilen in Querreihen länglicher Punkte aufgelöst. Die verhältnismässig breiteren Flügeldecken des ♀ zeigen im 3. Drittel der Naht einen gemeinsamen kleinen beborsteten Höcker, das Analsternit dieses Geschlechtes ist zum Hinterrande parallel bogig gefurcht und die Hinterschenkel erreichen die Deckenspitze nicht. Beim ♂ ist das Analsternit undeutlich punktiert und die Hinterschenkel überragen die Deckenspitze deutlich. Erstere sind wie die Schienen und Tarsen schwarz, fein zerstreut weisslich behaart und vor der Spitze mit einzelnen Schüppchen geziert.

54. **Metapocyrtus difficilis** sp. nov. (♂, ♀.)

Niger, rostro maris depressiusculo, crebre punctato, feminae parum convexo, impressione longitudinali obsoleta; prothorace sphaerico, longitudine latitudine fere aequali, vermiculato-granuloso, sulco mediano tenui, margine antico, vitta longitudinali supracoxali maculaque utrinque in medio intra marginem lateralem, aeruginoso-squamosis; elytris thorace fere aequilatis, sat fortier regulareque seriato-punctatis, maculis duabus basalibus, una dorsali altera marginali, duabus medianis, transverse dispositis margineque laterali plus minusve interrupte, aeruginoso-squamosis, feminae singulis apice cono brevi armatis et sutura in secundo triente tuberculo minuto, albo-setoso.

Long. 10–11, lat. 4–4.8 mm.

Patria: LUZON, provincia Tayabas, Antimonan, legit *W. Micholitz*, M. Dr.

Schwarz, mit spangrünen Punktmakeln auf dem Halsschild und den Flügeldecken. Rüssel des ♂ ähnlich wie bei *granifer*, aber nicht so stark platt gedrückt, mit undeutlicher Mittelfurche, die Basalfurche beiderseits über die Seitenkanten herabziehend, Rüsselseiten vor den Augen ohne Eindruck, der Rüsselrücken des ♀ sanft gewölbt, mit undeutlichem Längseindruck an der Wurzel. Stirn so lang wie breit, mit Mittelfurche. Halsschild sehr wenig breiter als lang, fast kugelig, mit wurmlinig zusammenfliessenden Körnern und feiner Mittelfurche, die Seiten über den beschuppten Hüftenstreifen fast glatt, sein Vorderrand ein Längsstreifen über den Hüften und eine schräge Punktmakel in der Mitte innerhalb des Seitenrandes, spangrün beschuppt. Flügeldecken beim ♂ kaum, beim ♀ wenig breiter als das Halsschild, ziemlich regelmässig gereiht-punktiert, beim ♂ ungefähr 1⅓ mal so lang wie das Halsschild, beim ♀ an der Spitze einzeln in einen kurzen konischen Zapfen ausgezogen und im 2. Drittel der Naht mit kleinem weiss beborstetem Höcker. Analsternit des

♀ in der Mitte etwas aufgetrieben und geglättet, beiderseits an der Wurzel leicht eingedrückt, beim ♂ gross und etwas undeutlich punktiert. Hinterschenkel des ♂ die Deckenspitze deutlich überragend, beim ♀ kaum erreichend.

55. **Metapocyrtus virgatus** sp. nov. (♂.)

Niger, prothorace linea transversa, rostro crebe ruguloso-punctato, lateribus ante oculos impressione longitudinali, cum scrobibus haud confluenti; prothorace longitudine latitudine aequali, lateribus paulo rotundatis, maxima latitudine ante medium, subtransverse ruguloso-granoso; elytris nitidis, regulare fortiterque seriato-punctatis, striis viridiaurato-squamosis, spatiis subcostatis, minutissime remoteque punctatis, fasciis duabus transversis, una ante, altera post mediana suturaque denudatis; pedibus sat parce pallide metasterno dense fulvo pilosis.

Long. 10, lat. 4.2 mm.

Patria: NEGROS, mons Canlaon, legit *Charles S. Banks* (Bur. Sci. Acc. No. 6251).

Glänzend schwarz, ein breiter Längsstreifen über den Vorderhüften und mit ihm verbunden der Vorderrand und ein Querstreifen in der Mitte des Halsschildes, sowie feine Längsstreifen auf den Flügeldecken goldig grün beschuppt. Rüssel dicht längsrunzelig, im Spitzenteil sparsamer und einfach punktiert, Rüsselseiten vor den Augen mit vor der Fühlerfurche erlöschendem Längseindruck. Stirn zwischen den Augen so breit wie lang, zerstreut punktiert. Halsschild so lang wie breit, abgeschliffen und etwas querrunzelig gekörnt, längs des Hinterrandes (vor der Randfurche) mit geglätteter Zone, Seiten in der Basalhälfte ziemlich gerade und nach vorn divergierend, dann zugerundet, ihre grösste Breite etwas vor der Mitte. Flügeldecken kräftig gereiht-punktiert, die Punkte einer Reihe hie und da seitlich verschoben, daher unregelmässig zweireihig erscheinend, die inneren 6 Punktstreifen sowie von da ab nach aussen die ganzen Deckenseiten goldgrün beschuppt, die Naht und 2 Querbinden, eine vor und eine in der Deckenmitte, bis zum 6. Streifen nach aussen reichend schwarz kahl, die inneren 3 Spatien etwas rippenartig vortretend glänzend schwarz, Unterseite und Beine spärlich weisslich behaart, die Hinterbrust in der Mitte mit gelblichem Haarbüschel.

56. **Metapocyrtus puncticollis** sp. nov. (♀.)

Niger, prothorace utrinque maculis transversis, elytris fasciis tribus maculaque apicali margaritaceo-rosaceo-squamosis; rostro punctato, convexo, basin versus angustiore impressione dorsali mediana antrosum dilatata, impressione laterali foveata, antrorsum angustata; prothorace transverso, punctato, spatiis subrugulosis, lateribus in dimidia parte basali vix rotundatis, maxima latitudine ante medium, margine antico maculaque utrinque, cum macula supracoxali conjuncta, squamosis; elytris subgeminato-seriato-punctatis (spatiis in disco interdum subcostatis), fasciis squamosis tribus ad suturam interruptis, tertia per marginem apicalem cum macula apicali arcuatim conjuncta.

Long. 11, lat. 5 mm.

Patria: SIBUYAN, legit *R. C. McGregor* (Bur. Sci. Acc. No. 7665).

Schwarz, ziemlich glänzend mit rötlich perlenartig schimmernden Schüppchenquerbändern auf dem Halsschild und den Flügeldecken. Rüssel an der etwas verengten Basis kräftig punktiert, gewölbt, der mediane Dorsaleindruck nach vorn allmälig verbreitert, der Seiteneindruck, vor dem Auge grubig, vorn spitz auslaufend, die Fühlerfurche nicht erreichend. Halsschild quer, kräftig, auf der Scheibe etwas sparsamer punktiert, die Zwischenräume, namentlich nach den Seiten zu, gerunzelt, der nach oben zu sich verbreiternde Vorderrand, ein breites Längsband über den Vorderhüften und mit ihm meist in Verbindung stehend, eine Quermakel etwas hinter der Thoraxmitte, beschuppt. Flügeldecken kräftig und undeutlich doppelreihig punktiert, das heisst, der Abstand von je 2 Punktreihen nur wenig kleiner als die Breite des Spatiums zwischen ihnen und der nächsten Doppelreihe, die Spatien bei einem Exemplar auf der Scheibe etwas rippenartig, bei diesem scheinen die Decken einreihig punktiert. Von den 3 Schuppenquerbinden der Decken erreicht keine die Naht die an der Wurzel zieht auf dem Seitenrande bis zu den Hinterhüften, die mittlere ist auf der Scheibe leicht nach hinten gebogen, die Anteapicalbinde ist mehr oder weniger durch eine über den Spitzenrand der Decken laufende Bogenlinie mit der Apicalmakel verbunden, ausserdem ist der Seitenrand der Decken zwischen der 2. and 3. Querbinde beschuppt. Analsternit (des ♀) mit 2 leichten Längsbeulen. Beine sparsam aber ziemlich lang weisslich behaart.

57. **Metapocyrtus dolosus** sp. nov. (♂, ♀.)

Niger, rostro latitudine dorsali duplo longiore, crebre ruguloso-punctato, lateribus fovea oblonga anteoculari profunda; prothorace transverso (praesertim in femina), despumato-granoso, sulco mediano distincto, in femina area oblonga, discali, glabra, in medio subsulcata, margine antico, macula supra coxas anticas lineaque transversa, arcuata eacum conjuncta, pone medium, plerumque in medio interrupta, aeruginoso-squamosis; elytris subseriatim punctatis, maris thorace aequilatis, feminae angustioribus et apice conjunctim ac obtuse productis, fasciis tribus, una basali, una antemediana, tertia in secundo triente (inter se per marginem lateralem squamosum conjunctis) vittaque, interdum deficiente, in spatii secundi triente apicali, cum fascia tertia plerumque conjuncta, aeruginoso-squamosis; pedibus nigris, femoribus albido-, tibiis tarsisque nigricanti-setulosis; segmento analis maris fortiter transverso, sat crebre punctato ac albido setuloso, feminae longitudine latitudine basali aequali, rude ruguloso-punctato.

Long. 10–12, lat. 4.2–5 mm.

Patria: Insulae Philippinae, M. Dr. ex coll. *Faust.* (*A. astiger* Dohrn in litt.)

Eine dem *M. subfasciatus* Waterh. und *erichsoni* Chevr. (*gibbirostris* Waterh.) ähnliche Art, von ersterem dadurch unterschieden, dass das Halsschild keinen medianen Längsschuppenstreifen in der Basalhälfte besitzt, die basale Rüsselquerfurche sich nicht über die Seitenkanten herabzieht, das Halsschild breiter, in der Mittellinie leicht gefurcht, der abgesetzte Vorderrand nach unten zu deutlich verschmälert ist und die Deckenquerbänder schmäler, die Punktreihen kräftiger, beim ♀ überdies dadurch dass die Decken hinten gemeinsam spitzer ausgezogen sind und das Halsschild in der Mitte der Scheibe einen glatten spindelförmigen Längsstreifen aufweist; von letzterem durch das gekörnte mit einer Mittelfurche versehene (statt punktierte) Halsschild, durch den abgeflachten Rüsselrücken des ♂, ebenfalls durch die schmäleren Deckenbinden und vor allem durch die secundären Geschlechtscharaktere. Bei *M. erichsoni* Chevr. (♀) ist der Rüssel an der Wurzel sehr auffällig gehöckert (Taf. I, Fig. 6a.), die Decken sind hoch gewölbt, aber an der Nahtspitze nicht ausgezogen, sonderen klein halbkreisförmig ausgerandet, die Nahtspitze selbst etwas vorgewulstet, während bei *dolosus* der Rüssel des ♀ keine Spur eines Höckers zeigt und die Decken hinten in eine gemeinsame kurze, stumpfe Spitze ausgezogen sind, die etwas nach unten gekrümmt. Die beschuppte Querlinie des Halsschildes ist bei *dolosus* derartig gebogen, dass sich ihr mittlerer Teil, der häufig unterbrochen ist, dem Basalrand nähert, die 3. Schuppenquerbinde der Decken ist wie bei *subfasciatus* Waterh. hinten durch einen Längsstreifen auf dem 2. Spatium mit dem beschuppten Seitenrand verbunden. Hinterschenkel des ♂ die Decken hinten deutlich überragend beim ♀ die Deckenspitze eben erreichend.

58. **Metapocyrtus bituberosus** sp. nov.

Niger, supra squamulis splendide viridi-auratis tectus, plerumque elytris omnino aut bisfasciatim denudatis, pedibus genubus nigris exceptis, rufis aut totis nigricantibus; rostro in utroque sexu valde diverso, maris recto, dorso crebre ruguloso, impressione mediana, subter sulcis duobus retrorsum convergentibus, spatio inter sulcis postice plus minusve tuberculato; feminae rostro basi bituberculato-elevato, subter cono retrorsum directo; prothorace longitudine latiore, crebre minuteque granuloso, in femina area discali oblongo-elliptica, glabra; elytris oblongo-ovatis, prothorace fere aequilatis, margine basali anguste elevato, in femina apice horizontaliter productis; corpore subter parce subtiliterque setuloso, metasterno segmentoque primo in mare subtilissime granulosis, in femina leviusculis ac segmento ultimo rude rugoso-punctato.

Long. 8–10.5, lat. 3.8–4.2 mm.

Patria: MINDANAO, Davao, legit *W. Micholitz*, M. Dr., Acc. 1910.

Eine durch die Hinfälligkeit der goldig glänzenden Beschuppung oft schwer erkenntliche Art; namentlich die Weibchen, bei welchen die abgeriebenen Stellen oft die Form von 2 schwarzen Querbinden, eine vor und eine hinter der Deckenmitte, annehmen, haben oft viel Ähnlichkeit mit *M. erichsoni* Chevr., sind aber durch die weiter unten beschriebene Rüsselbildung leicht von diesen zu unterscheiden.

Rüssel des Männchens gerade, in einer Flucht mit der Stirn verlaufend, nicht ganz verrundeten Seitenkanten, dicht runzelig punktiert, mit deutlichem Mitteleindruck, an den Seiten vor den Augen mit etwas dreieckig erweitertem Längseindruck. Rüsselunterseite mit 2 nach hinten convergierenden Furchen, das von diesen eingeschlossene spitze Dreieck im Scheitel beim ♂ mit einem kleinen Höcker, beim ♀ mit einem kräftigen nach hinten gerichteten Zapfen, Rüsselwurzel bei letzterem von der Stirn abgesetzt und gleich vor der Basalfurche mit einem Doppelhöcker. Halsschild kugelig, quer, beim ♂ zuweilen etwas breiter als die Decken und mit Andeutung einer Mittelfurche, dicht und fein gekörnelt, beim ♀ mit elliptischer den Vorderrand nicht erreichender glatter Discalfläche und stärker und nach vorn mehr als nach hinten zugerundeten Seiten. Flügeldecken bei ganz reinen Stücken dicht metallisch goldgrün beschuppt, die Beschuppung höchstens durch entfernte Punktreihen unterbrochen, die sich bei abgeriebenen Stücken als etwas verworren ausweisen. Naht beim ♀ zu Beginn der Spitzenabschrägung etwas seitlich zusam-

mengedrückt und kaum merklich höckerig vorgezogen, ihre Spitze ziemlich lang horizontal ausgezogen. Beine, mit Ausnahme der schwarzen Knie, rot, zuweilen auch ganz schwärzlich. 1. und 2. Bauchsternit des ♂ sehr fein und entfernt gekörnelt, die des ♀ fast glatt, Analsegment bei letzterem grob runzelig-punktiert.

59. **Metapocyrtus figuratus** sp. nov. (Taf. II, Fig. 13.)

Aterrimus, lineis glauco-squamosis ornatus; rostro latitudine longiore, dorso apicem versus paulo dilatato, in dimidia parte basali fortius ac remotius quam in apicali punctato, sulco basali manifesto, dorsali tenui, laterali oblongo, profundo; prothorace transverso, elytris latiore, granuloso, margine antico lineisque tribus longitudinalibus chloro- aut glauco-squamosis et quidem una mediana marginem anticum tangente, una utrinque obliqua longe ante marginem anticum abbreviata ac post per lineam supracoxalem cum marginem anticum conjuncta; elytris distincte ac sat irregulariter punctatis, linea basali et marginali, hac apice per spatium secundum antrorsum curvata, linea antemediana, transversa, ad suturam abbreviata et per lineam longitudinalem, lateralem, cum linea basali conjuncta, linea transversa, curvata, anteapicali, vittam subsuturalem cum linea marginali conjungente, glauco-squamosis, corpore subter pedibusque nigris, parce fuscopilosis, femoribus posticis elytrorum apice superantibus.

Long. 9, lat. 4.2 mm.

Patria: Insulae Philippinae, M. Dr., D. E. M., CATANDUANES, legit *J. Whitehead,* Br. M.

Schwarz, wenig glänzend, mit bläulich oder grünlich weissen Schuppenlinien auf dem Halsschild und den Flügeldecken. Rüssel länger als breit, in der Apicalhälfte viel feiner und dichter als in der Basalhälfte punktiert, mit vorn etwas grübchenartig erweiterter und verflachter Dorsalfurche und tiefer, länglicher Seitenfurche. Stirn mit zerstreuten Punkten. Halsschild quer, breiter als die Flügeldecken, grob gekörnt, mit Mittelfurche, diese sowie eine Linie am Vorderrand und eine mit dieser aussen zusammenhängende dicht über den Vorderhüften, nach dem Hinterrande ziehende und dann wieder nach vorn umgebogene und nach der Mitte des Vorderrandes gerichtete Linie grünlich oder bläulich weiss beschuppt (zuweilen ist letztere am Halsschildhinterrande unterbrochen). Flügeldecken am ganzen Basalrand erhaben, spitz eiförmig, im Spitzendrittel der Naht mit entfernt gereihten abstehenden Härchen, eine Basal- und eine Seitenrandlinie, von welchen letztere sich an der Spitze mit dem gleichfarbig beschuppten Spitzendrittel des 1. Spatiums vereinigt, sowie eine, zuweilen punktartig unterbrochene die Naht nicht erreichende Querlinie und eine gebogene vor der Spitze, die den beschuppten Seitenrandstreifen mit den neben der Naht verbindet und endlich eine Längslinie im 1. Drittel des 6. Spatiums, die den Basalquerstreifen mit den Deckenquerstreifen verbindet, grünlich oder bläulich weiss beschuppt. Unterseite schwarz, in der Mitte mässig dicht mit abstehenden feinen gelben Härchen bedeckt. Hinterschenkel die Deckenspitze deutlich überragend.

6. Subgenus Trachycyrtus nov.

Die Arten mit gereiht-gekörnelten oder runzelig körnigen Flügeldecken, die ich unter diesem Namen zusammenfasse, stehen sich zum Teil ausserordentlich nahe, zum Teil dürften einige davon als Synonyme zusammenzuziehen sein. Da mir die meisten Typen dieser Gruppe nicht, oder nur in einem Geschlecht und dann oft nicht gleichseitig vorgelegen haben, so bin ich leider nicht imstande eine erschöpfende synoptische Tabelle zu geben. Es gehören folgende Arten hierher: *adspersus* Waterh., *bispinosus* Waterh., *germari* Waterh., *gibbicollis* Faust, Ent. Zeitg. Stett. (1895), 7, *immeritus* Boh. (= ? *viridulus* Chevr.), *miser* Faust (loc. cit., p. 8), *nanus* Boh., *profanus* Erichs., *pulverulentus* Waterh., *ruficollis* Waterh., *sparsus* Faust (loc. cit., p. 9), und *spinipes* Chevr.

Die mir vorliegenden Arten habe ich versuchsweise in folgende Tabelle gebracht:

a^1. Rüsselseiten vor dem Auge mit deutlichem Eindruck, Körperlänge mindestens 6 mm.

b^1. Flügeldecken mit breiten, scharf begrenzten, grünen Schuppenbinden in und hinter der Mitte ausserdem die Deckenspitze beschuppt, Halsschild mit seichter Mittelfurche (*subfasciatus* Boh.) = *chevrolati* Waterh. (Hieher gehören vielleicht auch *acutipennis* Waterh. und *concinnus* Waterh.)

b^2. Flügeldecken ohne oder nur mit verschwommenen Nebelbinden an der Basis und in der Mitte, oder mit beschuppten Punktmakeln.

c^1. Halsschild innerhalb des Seitenrandes mit dicht beschuppten Längsstreifen, Flügeldecken mit einigen weissen Schuppenpunkten. **sparsus Faust.**

c^2. Halsschild ohne Seitenrandstreifen, hinter der Mitte mit einer, Decken mit 3 Querreihen bindenartig angeordneten Schuppenmakeln .... **germari Waterh.**

c^3. Halsschild nicht oder nur gleichmässig und spärlich beschuppt.

d^1. Vorderrand der Hinterbrust durch eine Furche wulstartig abgesetzt, Flügeldecken gleichmässig grünlich beschuppt, sehr fein gekörnelt. Decken des ♀ zu Beginn der Deckenabschrägung mit Haarbürste (*dives* m. in litt.) .... ? **immeritus Boh.**

d^2. Vorderrand der Hinterbrust ohne Vorderrandfurche.

e^1 Halsschild an den Seiten über den Vorderhüften kaum, Flügeldecken sehr fein und spärlich gekörnt mehr oder weniger dicht grünlich beschuppt, Deckenspitzen beim ♀ leicht schnabelartig gemeinsam nach unten gebogen................ **profanus Er.**

e^2. Halsschild an den Seiten deutlich gekörnt.

f^1. Halsschild stark kugelig gewölbt, im Profil die Längswölbungslinie (längs der Naht) weit überragend, Flügeldecken an den Seiten aüsserst fein und hauptsächlich nur in den Punktreihen gekörnelt, Decken rötlich, die des ♀ mit an der Spitze etwas klaffender Naht, am vorderen Ende des Seitenrandes mit undeutlichem Längswulst........ **gibbicollis Faust.**

f^2. Halsschild mässig kugelig gewölbt, die Längswölbungslinie der Decken kaum überragend.

g^1. Basalrand der Decken aussen scharfkantig.

h^1. Flügeldecken an der Wurzel und in der Mitte mit Nebelbinde, die des ♀ an der Wurzel des Seitenrandes ohne Tuberkel an der äussersten Spitze einzeln abgeschrägt und etwas wulstig.. **spinipes Chevr.**

h^2. Flügeldecken ohne Binden, viel kleiner und schlanker als die vorige Art, nur 6-6.5 Millimeter lang, Decken des ♀ an der Wurzel des Seitenrandes mit scharfem Körnchen...? **adspersus Waterh.**

g^2. Basalrand der Decken nicht scharfkantig.

i^1. Deckenkörner etwas flachgedrückt querrunzelig zusammenfliessend zuweilen längs der Punktreihen wesentlich grösser als in den Spatien und etwas längsrippenartig zusammenfliessend. (♀) Rüssel mit 2 deutlichen nach vorn stark divergierenden Dorsalleisten, Halsschild und Beine rot, Decken schwarz, spärlich beschuppt.
? **ruficollis Waterh.**

i^2. Deckenkörner nicht flachgedrückt und nicht zusammenfliessend, Rüssel mit kaum wahrnehmbaren fast parallelen Dorsalleisten, Käfer einfarbig dunkelrot, spärlich blau beschuppt. Seitenrand der Decken beim ♀ an der Wurzel mit kräftigem Körnchen (vielleicht nur Localrasse, Gebirgsform des vorigen)................. **miser Faust.**

a^2. Rüssel vor dem Auge höchstens mit undeutlichem, auf dem Rüssel ohne Eindruck, Halsschild ohne Vorderrandfurche, Länge 5.5 mm.
pulverulentus Waterh.

7. Subgenus **Homalocyrtus** nov.

a^1. Flügeldecken mässig dicht punktiert, die Zwischenräume fein lederartig gerunzelt.

b^1. Apicalteil der Decken beim ♂ recht- oder spitzwinkelig abfallend, beim ♀ mit schwachem beborsteten Suturalhöcker im zweiten Deckendrittel und jede einzelne an der äussersten Spitze quer leicht s-förmig ausgeschnitten, an der Wurzel des Seitenrandes mit glänzendem Korn (? *marginenodosus* Chevr. ♀)................. **60. intermittens sp. nov.**

b^2. Apicalteil der Decken beim ♂ stumpfwinkelig, oder verrundet abfallend, beim ♀ die Deckenspitzen gemeinsam klein halbkreisförmig ausgeschnitten (*rufescens* Waterh. ♀).................... **subcuneiformis Waterh.**

a^2. Flügeldecken mehr oder weniger deutlich gereiht-punktiert, die Zwischenräume nicht fein runzelig, sondern glatt, entweder unbeschuppt oder teilweise, oder ganz beschuppt.

c^1. Oberseite ganz metallisch grün oder bläulich beschuppt, kleine schlanke Form, Apicalteil der Flügeldecken des ♂ steil stumpfwinkelig (circa 120°), beim ♀ sehr wenig winkelig abfallend mit Suturalbürste, jede Spitze einzeln bogig ausgerandet.......................... 61. **harpago** sp. nov.

c^2. Oberseite teilweise beschuppt, Halsschild jederseits mit Schuppenmakel, Flügeldecken längs der vorderen 2 Drittel der Naht und im Spitzenteil, sowie 2 oft makelartig unterbrochene Querbinden kahl. Sehr breite, robuste Form in beiden Geschlechtern mit gerundetem Deckenabsturtz, ohne Haarbürste...................... 62. **tumidosus** sp. nov.

c^3. Oberseite kahl, Körperform in der Mitte zwischen den beiden vorhergehenden stehend, Flügeldecken des ♂ in steilem Bogen hinten abfallend .... **conicus** Boh.
(Diese Arten bedürfen, sobald grösseres Material beider Geschlechter von bestimmten Localitäten vorliegt, noch genauer Untersuchung.)

60. **Metapocyrtus (Homalocyrtus) intermittens** sp. nov. (♂, ♀, Taf. I, Fig. 29, u. 29a.)

Brunneus, interdum squamulis glaucis perpaucis adspersus, pedibus plus rufescentibus; rostro crebre subruguloso-punctato, scrobibus margine superiori elevato, sulco basali recto; prothorace longitudine paulo latiore, crebre ruguloso-granoso, basi apice latiore; elytris subtilissime coriaceis, sat dense, vix seriatim punctatis, punctis setuligeris, maris dorso depressiusculis, maxima latitudine apice quam media propiore, parte apicali abrupte declivi sutura subrectangulare fracta, in angulo setosa, feminae ovato-acuminatis, convexis, lateribus seriebus tribus tuberculatis humeris tuberculo munitis, parte apicali modice declivi antice tuberculo communi setuloso, sutura apice excisa.

Long. 10-14, lat. 5.2-7.5 mm.

Patria: TALAUT, M. Dr. (coll. *Faust* ex Mus. Tring) LUZON, (ex coll. *Dohrn*).

Dunkel rotbraun, die Beine, mit Ausnahme der schwarzen Schenkel und Schienenspitzen, mehr oder weniger rot, Decken mit sehr kleinen und ganz vereinzelten bläulichen Schüppchen. Rüssel des ♂ dicht runzelig punktiert, jeder Punkt mit kurzem quer gestelltem bläulichen Härchen, basale Querfurche nicht breiter und tiefer als die Medianfurche, die Seitenkanten des Rüssels nicht durchschneidend. Rüsselseiten vor dem Auge mit dreieckigem Eindruck, so dass der Oberrand der Fühlerfurche leistenartig vortritt. Fühler schwarz, 1. Geisselglied länger als das 2., das 7. kurz konisch, nur wenig von der Keule abgesetzt. Halsschild dicht und etwas runzelig gekörnt, sehr wenig breiter als lang, die grösste Breite in der Mitte, vorn und hinten mit Randfurche, am Vorderrand und über den Vorderhüften mit einzelnen bläulichen Schüppchen. Flügeldecken sehr fein lederartig gerunzelt, ziemlich dicht, kaum gereiht-punktiert, die Zwischenräume beim ♂ schwach, beim ♀ deutlich gekörnt, jedes Körnchen mit von hinten eingestochenem bläulichen Börstchen, ausserdem hie und da, namentlich an den Seiten, bläulichen Schüppchen. Oberseite der Decken beim ♂ etwas abgeflacht, an der Wurzel so breit wie die Basalbreite des Halsschildes, im 2. Drittel fast bis zur doppelten Basalbreite verbreitert, der Spitzenteil derartig spitzwinkelig abfallend, dass die Nahtspitze von oben nicht sichtbar ist, sondern von dem stumpfen beborsteten Nahthöcker überragt wird. Decken des ♀ gestreckt eiförmig, an der Aussenecke des Basalrandes mit glänzender glatter Schwiele, an den Seiten mit 3 Reihen grösserer Körner, im 2. Drittel der Naht mit runder, kaum höckerig vortretender Haarbürste, jede Decke einzeln an der Spitze kurz ausgerandet. Beine dunkelrot, die Kniee, Schienenspitzen und Tarsen schwarz. Naht zwischen dem 1. und 2. Bauchsternit beim ♀ in der Mitte ganz verstrichen.

Als Typus der Art sehe ich die Form von Talaut, die sich durch besondere Grösse auszeichnet an, während die von Luzon eine kleinere Rasse zu bilden scheint.

61. **Metapocyrtus (Homalocyrtus) harpago** sp. nov. (♂, ♀.)

M. conico Boh. similis sed minor omnino sat dense metallice viridi-squamosus, rostro lateribus parallelis ante oculos subtriangulariter impressis, sulco basali ad oculos determinato; prothorace subtransverso, crebre granuloso, interdum linea mediana impressa; elytris prothorace duplo longioribus, lateribus maris subrectis retrorsum ultra medium divergentibus, dein rotundato acuminatis, parte apicali obtusangulariter declivi, in utroque sexu sutura in secundo triente macula setulosa, feminae ellipticis, singulis apice breviter excisis; femoribus tibiisque, apice excepto, rufis.

Long. 7-10, lat. 2.5-4.8 mm.

Patria: LUZON, M. Dr.

Die kleinste Art dieser Gruppe und vor allem an dem ziemlich dichten goldgrünen (zuweilen bläulichgrünen) Schuppenkleid, das die ganze Oberseite bedeckt, kenntlich. Rüssel an der Wurzel mit keiner oder sehr undeutlicher Dorsalfurche, in der Mitte mit dreieckigem Eindruck, sowie von der Mitte der Rüsselwurzel 2 undeutliche nach vorn divergierende und nach den Vorderecken der Fühlergruben ziehende Längswülste gebildet werden. Rüsselseiten vor dem Auge mit flachem dreieckigen Eindruck. Fühler rötlichbraun bis pechbraun. Halsschild etwas länger als breit, dicht hie und da etwas runzelig zusammenfliessend gekörnt, in der vorderen Hälfte zuweilen mit Andeutung einer Mittelfurche, Vorderrandfurche oberseits häufig erloschen. Flügeldecken ziemlich dicht, undeutlich gereiht-punktiert, die Zwischenräume nur hie und da zu undeutlichen leichten Querrunzeln zusammenfliessend, Apicalteil beim ♂ etwas stumpfwinkelig zur Rückenlinie abfallend, im 2. Drittel der Naht mit Haarbürste, mit der grössten Breite näher der Spitze als der Mitte, beim ♀ elliptisch, weniger steil abfallend, mit stärkerer Haarbürste und jede Decke an der Spitze einzeln kurz ausgerandet. Schenkel und Schienen, die schwarze Spitze ausgenommen, rötlich. Naht zwischen dem 1. und 2. Bauchsternit, wie bei den verwandten Arten, in der Mitte verstrichen.

62. **Metapocyrtus (Homalocyrtus) tumidosus** sp. nov. (♂, ♀.)

Piceus, pedibus plus minusve rufescentibus; rostro subnitido, sat dense (sed minus dense quam in H. intermittens) punctato, sulco basali ad rostri latera descendenti; prothorace granuloso, interum in dimidia parte apicale linea mediana impressa; elytris maris subobconice rotundatis, latitudine sexta parte longioribus, feminae ovatis, aurato-squamosis vitta suturali, in duabus trientibus basalibus fasciisque duabus, in primo et secundo triente, denudatis.

Long. 8–11, lat. 4–6 mm.

Patria: LUZON, M. Dr. (coll. *Faust, Dohrn, Kirsch*).

Die kürzeste und breiteste Art der Gruppe und durch die mehr goldige als grünliche Deckenschuppung, die durch 2 unscharfe kahle Querbinden und einem Längsstreifen in den basalen 2. Dritteln und im Spitzenteil der Naht unterbrochen wird, ausgezeichnet. Rüssel dicht punktiert, die Zwischenräume zwischen den Punkten glänzend, Seiten des Rüssels kaum merklich ausgebaucht, vorn etwas convergierend, vollkommen abgerundet, vor dem Auge ohne Längseindruck, die tiefe Basalquerfurche über die Seitenkanten des Rüssels herabziehend. Halsschild kaum länger als breit, die Seiten in den basalen 2. Dritteln gerade, nach vorn sehr leicht divergierend, oberseits flach gekörnelt, selten mit einer Mittelfurche, bei gut erhaltenen Stücken der nur durch eine undeutliche Furche begrenzte Vorderrand und jederseits der Scheibe je eine Makel mässig dicht goldig grün beschuppt. Flügeldecken des ♂ nur um ½ länger als breit, mit der grössten Breite hinter der Mitte, an der Wurzel so breit wie die Halsschildbasis, die Seiten von da ab nach hinten geradlinig divergierend, ziemlich unregelmässig gereiht-punktiert, die Zwischenräume eben, nur im Spitzendrittel vor jedem Punkt in Form eines kleinen borstentragenden Körnchens aufgetrieben, Naht im 2. Drittel, zu Beginn der in steilen Bogen abgefallenen Deckenspitze mit gehäuften im weiteren Verlauf mit kürzeren gereihten Börstchen. Decken des ♀ eiförmig zugespitzt, die Punktreihen zuweilen etwas paarig angeordnet die Zwischenräume in der vorderen Deckenhälfte etwas körnig gerunzelt, jede Deckenspitze einzeln kurz bogig ausgerandet, Naht im Spitzenteil weniger steil wie beim ♂ abfallend, im 2. Drittel mit einer Gruppe von entfernten Borstenhaaren.

CELEUTHETIDÆ.

Übersicht der Gattungen mit hinter den Augen abgeschnürtem Kopf und dicht zusammenstossenden Vorderhüften.[19]

a^1. Flügeldecken mit 10 ganzen Streifen, Rüsselrücken nicht dreifurchig, Stirn eben, Schildchen nicht sichtbar.

a^2. Flügeldecken nur mit 9 ganzen Streifen, der 10., wenn vorhanden, im mittleren Teil lang unterbrochen.

- b^1. Fühlerfurche rinnenartig, der Rüsselrücken senkt sich weit hinten, in einer Querlinie mit dem Augenhinterrande zur Stirn herab, diese ohne Eindruck. Schildchen vorhanden .... Polycatus gen. nov.
- b^2. Fühlerfurche grubenförmig, der Rüsselrücken beginnt weit vor dem Augenhinterrand.
  - c^1. Stirn ohne grubigen Eindruck.
    - d^1. Rüsselrücken schmal, kaum von ⅓ der Rüsselbreite, Stirn mit eingegrabenem Längsstrichelchen, 2. Geisselglied so lang wie die 3 folgenden .... Calidiopsis gen. nov.
    - d^2. Rüsselrücken breit, in der Basalhälfte kugelig aufgetrieben, mit 2 Längsleisten, 1. und 2. Geisselglied an Länge wenig verschieden .... Neopyrgops gen. nov.
  - c^2. Stirn mit grubigem Eindruck, 2. Geisselglied immer viel länger als das erste .... Pyrgops Schach.

Genus POLYCATUS nov.

Celeuthetidarum.

Rostrum capite paulo angustius, latitudine duplo longius, dorso recto, subcarinato. Frons post oculos transversim depressiuscula. Oculi modice convexi. Antennarum scapus rostro fere aequilongus, prothoracis marginem anticum haud attingens.

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[19] Als Ergänzung zu der von Faust in der *Ent. Zeitg.* Stett. (1897), 236, gegebenen Tabelle von No. 19 ab einzufügen. Die auf derselben Seite dort erwähnte neue Gattung *Eucyrtus* ist mit Recht, weil der Name bereits vergeben ist, von C. Berg. [*Com. Mus. Buenos Aires* (1888), 17] in *Eupyrgops* umbenannt worden, es zählen zu ihr drei philippinische Arten: *granulata, submaculata,* und *semperi* Faust, *loc. cit.*

Funiculus VII-articulatus. Scrobes sulciformes, oculi marginem inferiorem versus directi. Coxae anticae contiguae. Prosternum sulco marginali. Processus mesosternalis teniaeformis, postice truncatus. Metasternum coxis intermidiis haud longius, sutura episternalis integra, episterna angusta. Prothorax basi trunctatus. Scutellum distinctum, minutum. Elytra deciesstriata, stria decima in parte mediana obsoleta. Segmentum abdominale primum processu intercoxali coxis aequilato, secundum margine antico arcuato, tertio et quarto simul sumptis paulo longius. Femora inermia, postica elytris haud superantia. Tibiae posticae corbiculis cavernosis.

Typus der Gattung ist: *P. aurofasciatus* sp. nov.

63. **Polycatus aurofasciatus** sp. nov. (Taf. II, Fig. 15.)

Aterrimus, glaber, fasciis auro-rosaceis ornatus; rostro latitudine vix sesqui longiore, linea mediana glabra, vix carinata; prothorace latitudine longiore, maxima latitudine ante medium, lateribus in dimidia parte basali subsconstrictis, margine antico et postico rosaceo-squamosis; elytris oblongo-ovatis, striatopunctatis, striis binis subapproximatis, in primo et in tertio quarto, interdum etiam in medio, fascia auro-rosaceo-squamosis, ad suturam interruptis; pedibus viridi-squamosis.

Long. 12.5-15, lat. 3.8-6 mm.

Patria: BASILAN, Feb.-Mar. 1898, legit *Doherty* M. Dr. (ex coll. *H. Fruhstorfer*).

Glänzend schwarz, mit rosagoldigen Querbinden und grün beschuppten Beinen. Rüssel kaum 1½ mal so lang wie breit, auf dem Rücken abgeflacht mit kaum vortrender, glatter Mittellinie, sonst grün beschuppt. Fühler kräftig, der Schaft ungefähr so lang wie der Rüssel, die Geissel bläulich beschuppt, ihr 1. und 2. Glied gleich lang, die folgenden unter einander ziemlich gleich lang, nur das 7. etwas deutlicher länger als das vorhergehende, Keule an der Wurzel blau, im übrigen schwarz tomentiert. Halsschild länger als breit, vor der Mitte am breitesten und nahe dem Vorderrand mit Mittelgrübchen, die Seiten in der Basalhälfte parallel, oder etwas eingeschnürt, ziemlich dicht, flach und fein punktiert, ausserdem mit sehr zerstreuten tieferen Punkten, die Beschuppung des Vorderrandes gleich breit, die des Hinterrandes in der Mitte etwas nach vorn winkelig erweitert. Schildchen klein, aber deutlich und tomentiert. Flügeldecken gestreckt eiförmig, entfernt gereiht-punktiert, je 2 Punktreihen einander genähert, Spatien vollkommen eben, Basalrand etwas in der Mitte aufgebogen. Je eine über der Hinterbrust und eine ungefähr über dem Basalrand des Anal-

segments beginnende und fast bis zum 1. Punktstreifen nach innen reichende Binde, goldig rosenfarbig beschuppt.

Zuweilen (♀) zwischen diesen beiden Binden noch eine 3. die aber vom 1. Punktstreifen nur bis zum 8. nach aussen reicht, mitunter auch in 3–4 Punkte aufgelöst ist. Bei schön erhaltenen Exemplaren sind die rosa Binden mit hellgrün metallisch schimmernden Schüppchen gesäumt und der Spitzenrand der Decken ebenfalls mehr oder weniger grün beschuppt. Unterseite, namentlich die Seiten der Hinterbrust, rosa-grün, das 1. und letzte Segment meist, die Beine immer, grün beschuppt.

Genus **CALIDIOPSIS** nov.

Celeuthetidarum.

Rostrum subquadratum, dorso fere quarta parte latius. Scrobes fossulatae. Antennarum scapus thoracis dimidium attingens. Funiculus VII-articulatus, articulus secundus valde elongatus. Oculi modice convexi, margine superiore sulcato. Metasternum coxis intermediis aequilongum, sutura episternalis antice impressa, reliqua squamulis obtecta. Scutellum nullum. Elytra novies-striata. Reliqua ut in genere Polycatus.

Die einzige bisher bekannte Art, dieser mit *Polycatus* verwandten Gattung ist:

64. **Calidiopsis speciosa** sp. nov. (Taf. II, Fig. 14.)

Aterrima, erect parceque nigro-setosa, prothorace marginibus, elytris fascia antemediana, ad suturam angustata trienteque apicali, vitta suturali excepta, pallide rosaceo-, pedibus viridisquamosis; prothorace latitudine distincte longiore, maxima latitudine ante medium, grosse parceque punctato; elytris oblongo-ovatis, seriato-punctatis, stria sexta septimaque basi abbreviatis, spatiis quatuor internis post fasciam seriato-granulosis, parum convexis, externis glabriusculis; corpore subter tres segmentis ultimis exceptis, viridi-squamoso, metasterno segmento primo secundoque grosse parceque punctatis.

Long. 7, lat. 3 mm.

Patria: MINDANAO, Zamboanga, legit *W. J. Hutchinson* (Bur. Sci. Acc. No. 8695).

Glänzend schwarz, lang abstehend sparsam beborstet, Halsschild am Vorder- und Hinterrand und unterhalb des Seitenrandes, ferner eine breite, an der Naht eingeengte Querbinde vor der Deckenmitte und eine grosse jederseits des Spitzendrittels der Decken einnehmende Makel blass rosafarben, die Beine grün beschuppt. Rüssel so lang wie breit, Rüsselrücken zwischen den Fühlergruben ein Fünftel so breit wie der Rüssel mit feiner Mittelfurche, grün beschuppt, an der Wurzel gescheitelten, borstenartigen, lehmfarbigen Schüppchen, Stirn sowie der Scheitel glänzend schwarz, erstere mit Längsgrübchen. Halsschild länger als breit, etwas kugelig gewölbt, seine grösste Breite vor der Mitte, sehr grob und zerstreut punktiert, der Basalrand ausgebuchtet. Flügeldecken länglich eiförmig, an der Wurzel nicht breiter als die Halsschildbasis, gereiht-punktiert, 6. und 7. Streifen an der Wurzel verkürzt, die ganze Naht und die inneren 5 Spatien hinter der beschuppten Querbinde gereiht-gekörnt, jedes Körnchen eine Borste tragend. Unterseite in der Mitte sparsam grünlich, die Seiten der Hinterbrust dicht rosafarbig beschuppt, 1. und 2. Bauchsegment entfernt und sehr grob punktiert, das letzte mässig dicht lehmfarben beschuppt.

Genus **NEOPYRGOPS** nov.

Celeuthetidarum.

Rostrum latitudine paulo longiore, parte basali tumidoso, dorso longitudinaliter convexo, bicarinato. Scrobes fossulatae. Antennarum scapus VII-articulatus sat robustus. Frons integra. Oculi valde prominuli, oblique subconici. Coxae anticae contiguae. Prothorax basi truncatus. Metasternum coxis intermediis aequilongum. Scutellum nullum. Segmentum primum abdominale processu intercoxali coxis latiore, secundum margine antico arcuato, duobus sequentibus unitis aequilongum. Elytra stria marginali in parte mediana longe interrupta. Femora mutica.

Typus der Gattung ist: *N. banksi* sp. nov.

65. **Neopyrgops banksi** sp. nov. (Taf. II, Fig. 4.)

Niger, nitidus, parce breviterque nigro-setosus; prothorace vittis duabus, elytris sutura, basi, fasciisque duabus quarum antemediana ad suturam interrupta, postmedina per marginem lateralem sutura conjunta, chloro- aut rosaceo-squamosis; corpore subter crebre asperato-granuloso, metasterno lateribus chloro- aut rosaceo-squamoso.

Long. tot. 11, elytrorum 6.5, thoracis 3.2, lat. elytrorum 5 mm.

Patria: NEGROS, Maao, legit *Charles S. Banks* (Bur Sci. Acc. No. 329).

Schwarz, glänzend, sparsam und kurz schwarz beborstet, 2 Längsstreifen auf dem Halsschild, die Naht und der Basalrand der Decken, sowie 2 Querbinden auf den Decken, vor denen die vor der Deckenmitte gelegene an der Naht breit unterbrochen, die hintere durch einen beschuppten Randstreifen mit der Naht verbunden ist grünlich oder rötlich weiss beschuppt. Rüssel wenig länger als breit, sein Rücken der Länge nach gewölbt, zwischen den Fühlern so breit wie die des halben Rüssels, mit 2 durch eine tomentierte Furche getrennten Längsleisten, der aufgetriebene Basalteil im Umriss fast kreisförmig, zerstreut und kräftig punktiert. Halsschild so lang wie breit, grob punktiert, an den Seiten abgeschliffen gekörnt, auf der Scheibe undeutlich gekörnt, beiderseits mit einem beschuppten Längsstreifen, der sich nach dem Basalrand zu etwas verbreitert, hinter dem Vorderrand aber spitzwinkelig nach hinten gebogen ist, um sich mit einer dreieckigen Schuppenmakel über den Vorderhüften zu verbinden. Flügeldecken kurz eiförmig, gewölbt, ziemlich grob gereiht-punktiert. Die Punkte am Vorderrande etwas raspelartig gekörnt und hie und da durch undeutliche Querrunzeln verbunden, der Basalrand glatt, nicht aufgebogen, die Spatien breiter als die Punktreihen, im Spitzendrittel, hinter der 2. Schuppenquerbinde, mit entfernt gereihten, glänzenden Körnern, eine Querbinde dicht hinter dem glatten Basalrand, eine vor der Mitte die bis zum 2. Punktstreifen nach innen reicht, aussen aber entlang des 7. Spatiums mit der Basalbinde verbunden ist und endlich eine Querbinde im 2. Deckendrittel und ein mit ihr zusammenhängender Streifen auf dem vorvorletzten und vorletzten Spatium, der sich mit der Spitze der Naht vereinigt, sowie die letztere rötlich oder grünlich weiss beschuppt. Vorderbrust, die Seiten der Hinterbrust und das 1. und 2. Bauchsegment an den Seiten und auf dem Hinterrand ebenso beschuppt, im mittleren Teil kahl und ziemlich dicht mit Raspelkörnchen besetzt, das sehr kurze 3. und 4. Segment nur je mit einer Querreihe von Raspelpunkten; Körnchen und Punkte tragen ein von hinten eingestochenes Börstchen. Beine vorherrschend schwarz, nur eine breite Binde an der Wurzel und vor der Spitze der Schenkel, die Aussenseite der Schienen und Tarsen mehr oder weniger hell beschuppt.

66. **Neopyrgops albovaria** sp. nov.

Praecedenti (N. banksi m.) statura similis sed fortius granulata, antennis pedibusque albo-setulosis; prothorace transverso; elytris maculis irregularibus chloro-albidis ornatis.

Long. 8–9, lat. 4. 2–5 mm.

Patria: MINDORO, Sibolon, legit *Dean C. Worcester* (Bur. Sci. Acc. No. 11393).

Ebenso robust und gedrungen wie *N. banksi* aber das Halsschild quer und die Flügeldecken mit unregelmässigen grünlich weissen Schuppenmakeln. Geisselglieder der Fühler nicht wie bei *banksi* schwarz, sondern weiss bewimpert, der gekrümmte Schaft dicht weisslich beschuppt und ebenso beborstet. Rüssel und Kopf bei beiden Arten in Grösse und Skulptur sehr ähnlich, Halsschild dagegen deutlich quer, in den Vorder- und Hinterecken mit querer weisslicher Schuppenmakel, je eine vordere und hintere Makel durch einen beiderseits der Scheibe verlaufenden Schuppenstreifen am Innenrand mit einander verbunden. Bei *N. banksi* verlaufen die Dorsalstreifen derartig, dass sie 2 mit den Rücken gegeneinander gekehrten arabischen 1 gleichen und Vorder- und Hinterecken vollkommen freilassen. Flügeldecken mit relativ grossen, glänzenden, flachen Körnchen bedeckt, die ein von hinten eingestochenes, gräuliches Börstchen tragen, ausserden mit unregelmässigen, aber doch etwas symetrisch angeordneten grünlich weissen Schuppenmakeln und zwar finden sich je eine Makel an den Schulterecken, dann eine kurze, streifenartige an der Wurzel und mehrere punktförmige etwas zusammenhängende Makeln im Spitzendrittel der Naht; die streifenartige, weisse Beschuppung in den hinteren 2 Dritteln des 4. Spatiums wird vorn von einer unregelmässig unterbrochenen, vom 1. Drittel des Seitenrandes nach der Nahtwurzel zu laufenden Schrägbinde begrenzt und kreuzt im 2. Drittel eine mehr oder weniger in Punktmakeln aufgelöste Querbinde, die weder den Seitenrand noch die Naht erreicht. Körperunterseite ähnlich wie bei *N. banksi*, in der Mitte unbeschuppt, dicht raspelartig gekörnt, Seiten der Vorder-, Mittel- und Hinterbrust, sowie die der 1. zwei Bauchsegmente und endlich die Schenkel an der Wurzel und vor der Spitze, die Schienen überall, aber spärlich, weiss beschuppt.

Genus **PYRGOPS** Schach.

67. **Pyrgops stellata** sp. nov.

Aterrima, pedibus rufescentibus, prothorace lineis tribus, elytris punctis numerosis spatiisque duobus exterioribus in dimidia parte apicali albido-squamosis, spatiis in dimidia parte anteriore transverse confluenti-granulosis, sex interioribus, ut sutura, sat confertim ac rude granulatis; femoribus inermibus.

Long. (capite haud computato) 8–8.5, lat. 3.5–4.5 mm.

Patria: LUZON, provincia Bataan, Lamao, legit *W. Schultze* (Bur. Sci. Acc. No. 9136).

Glänzend schwarz, Schenkel in der Mitte rot, Halsschild an den Seiten und in der Mitte mit bläulich-weiss beschuppten Längslinien, Flügeldecken mit eben solchen kleinen Punktmakeln, die

2 äussersten Deckenspatien in der hinteren Hälfte ganz dicht weisslich beschuppt. Spitzabschrägung des Rüssels so lang wie der Rüsselrücken, dicht runzelig und ziemlich grob punktiert, der kräftige an der Wurzel gebogene Fühlerschaft, längsgerieft, mit einigen zerstreuten, weisslichen Schüppchen, die letzten 3 Glieder der Fühlergeissel untereinander ziemlich gleich gross, nicht länger als breit, die Keule kurz eiförmig, 1½ mal so lang wie dick. Halsschild etwas länger als breit, nach vorn zu stärker als nach hinten zu verengt, dicht grob gekörnelt punktiert, die Körner etwas in die Länge gezogen und kleiner als die am Innenrand eine Borste tragenden Grübchen; dicht am Seitenrande, von oben gerade noch sichtbar und in der Mittellinie je eine Längslinie aus bläulich-weissen Schüppchen. Flügeldecken gereiht-punktiert, die Zwischenräume grob gereiht-gekörnelt, doch die feinen Punktreihen nur im Spitzendrittel deutlich, da in ihrer vorderen Hälfte die Punkte durch fast ebenso grosse quere Körnchen wie solche die Spatien aufweisen, getrennt sind, doch sind die Spatienkörnchen durch ein grobes, von hinten eingestochenes Börstchen ausgezeichnet, so dass von der Naht bis zum Seitenrand 7 Börstchenreihen gezählt werden. Das vorletzte Spatium meist im vorderen Drittel und in der hinteren Hälfte, das letzte nur in der hinteren Hälfte dicht bläulich weiss beschuppt. Deckenoberseite ausserdem mit unregelmässig zerstreuten Schuppenpunkten, die durchschnittlich kleiner als das Auge und ebenfalls weisslich sind. Vorder-, Mittel- und Hinterbrust, die Episternen der Mittelbrust, sowie das 1. und 2. Bauchsternit hinter den Hinterhüften dicht weiss beschuppt, mit eingestreuten Borstenpunkten, Epimeren der Mittelbrust und Hinterbrustepisternen unbeschuppt. Das beim ♀ gemeinsam vorgewölbte 1. und 2. Bauchsternit zerstreut und grob punktiert, jeder Punkt mit gebogenem Börstchen. Schenkel unbewehrt, an der Wurzel und Spitze, die Schienen auf der längsgerieften Aussenseite mit zerstreuten weisslichen Schüppchen.

68. **Pyrgops stellata** var. **aurocincta** nov. (♀.)

P. stellata validior, nigra, elytris basi spatiisque duobus exterioribus in parte apicali punctisque perpaucis ante apicem albido-squamosis, femoribus basi apiceque parce viridimicante squamosis.

Long. (capite haud computato) 11, lat. 5 mm.

Patria: Insulae Philippinae, M. Dr.

Wegen der vorherrschend einfarbig schwarzen Decken dem *Pyrgops inops* ähnlich, der Rüssel kürzer und dicker, die Spitzenabschrägung so lang wie der Rücken und in gleichmässigem

Bogen in letzteren übergehend, die Mittelfurche bis zur Stirngrube nach hinten reichend, Scheitel fein chagriniert und entfernt punktuliert. Halsschild grob runzelig punktiert, die je ein Börstchen tragenden Punkte viel grösser als die hie und da runzelig zusammenfliessenden Zwischenräume. (Bei *inops* ist das Halsschild dicht mit rundlichen Körnern bedeckt, die ein von oben, in einem relativ grossen Punkt eingestochenes Börstchen tragen.) Flügeldecken wie bei *inops* in den Spatien gereiht-gekörnelt, ein Querstreifen an der Wurzel der Decken, der aussen auf die Wurzel des vorletzten Spatiums umbiegt und den Seitenrand daher nicht erreicht, sowie das letzte und vorletzte Spatium in der hinteren Hälfte, ein Pünktchen im Apicalteil des 2. Spatiums, in die Vorder, Mittel- und Hinterbrust teilweise rötlich, teilweise grünlich weiss, die Schenkel an der Wurzel und Spitze mehr metallisch grün beschuppt. Vorletztes Spatium, in der Höhe und Ausdehnung des 1. Bauchsternites mit einer Doppelreihe scharfer Körnchen. Abdomen sehr tief und grob punktiert, 1. und 2. Bauchsternit stark bauchig vorgewölbt.

Ausser diesem einzigen Weibchen liegt mir noch ein Männchen einer Art aus dem Entomologischen National Museum in Berlin vor, das ich vorläufig auch als *aurocincta* bestimmte, obwohl es ziemlich abweichend vom Typus ist. Erst weitere Exemplare können dartun, ob alle Unterschiede auf die Geschlechtsverschiedenheit zurückzuführen sind. Dieses nur 9 mm. lange und 3.8 mm. breite Männchen zeigt auf dem Halsschild Punkte und gekörnte Punktzwischenräume von ungefähr gleicher Grösse, den beschuppten Querstreifen an der Deckenwurzel an der Naht unterbrochen und statt der hellen Beschuppung in der hinteren Hälfte der beiden äusseren Spatien, die fehlt, eine ungefähr dreieckige grün beschuppte Makel im Spitzenteil der Decken und eine kleine eben solche in der Mitte des Halsschildbasalrandes. Das vorletzte Spatium zeigt über dem 1. Bauchsternit nur *eine* Reihe feiner Körnchen.

69. **Pyrgops rufipennis** sp. nov.

Obscure fuscus, elytris rufis; capite vittisque duabus dorsalibus in thorace, elytrorum apice pedibusque plus minusve laete viridisquamosis; oculis hemisphaericis; prothorace elongato, inaequaliter rugoso-granuloso, disco pone marginem anticum leviusculo; elytris breviter ovatis, seriato-punctatis, spatiis inter puncta punctorum magnitudine ac granulosis, spatiis striis, seriato-punctatis, multo latioribus, minus ac remotius seriato-granulosis; femoribus subter minute acuteque seriato-granulosis.

Long. tot. 5.5–7, lat. 2.5–3.2 mm.

Patria; LUZON, provincia Cagayan, Ilagan, legit *H. E. Stevens* (Bur. Sci. Acc. No. 9834).

Dunkelbraun, Kopf und Fühler schwärzlich, Flügeldecken dunkel ziegelrot bis rotbraun, der Kopf, 2 Dorsalstreifen auf dem Halsschild, die äusserste Spitze der Flügeldecken sparsam, die Beine dicht, hell metallisch grün beschuppt. Fühlerschaft robust, deutlich länger als das Halsschild und bis zu dessen Mitte nach hinten reichend, stark gebogen, allmählich aber stark nach der Spitze zu verdickt, die Geissel verhältnissmässig fein, kürzer als der Schaft, ihre Glieder gestreckt kegelförmig, das 2. Glied länger als das 1.; Keule kurz elliptisch. Halsschild länger als breit, vor der Mitte am breitesten, oberseits ungleichmässig und runzelig gekörnt (die rundlichen Körnchen hie und da zu Querrunzeln zusammenfliessend), in der Mitte hinter dem Vorderrand etwas geglättet, an den Seiten sehr grob und weitläufig punktiert, mit haarfeiner Basalleiste und 2 grün beschuppten Dorsalstreifen. Schildchen nicht sichtbar. Flügeldecken kurz eiförmig, gewölbt, mit kräftigen Punktreihen, die Abstände der Punkte so gross wie die letzteren und gekörnt, die Zwischenräume viel breiter wie die Punktreihen, in der Mitte mit einer Reihe feiner entfernter Körnchen, die auf den drei äusseren Spatien sehr klein und undeutlich sind. 1. und 2. Bauchsegment grob und weitläufiger punktiert. Schenkel im mittlerem Teil unterseits mit einer Reihe von 4–5 kleinen spitzen Körnchen.

70. **Pyrgops exigua** sp. nov.

P. rufipenni similis, sed paulo major, unicolor ac obscurior, supra squamulis parcis griseis, capite, corpore subter pedibusque squamulis chloro-albidis tectis; prothorace elongato, aequaliter ruguloso-punctato; elytris sat profunde remoteque seriato-punctatis, spatiis minute seriato- ac setuloso-granulatis, punctorum seriebus perpaulo latioribus, squamulis minutissimis griseis sat dense tectis.

Long. 7.5, lat. 3.5 mm.

Patria: CAMIGUIN, legit *R. C. McGregor* (Bur. Sci. Acc. No. 7805).

Dem *P. rufipennis* sehr ähnlich, die Grundfarbe aber dunkler und einfarbig schwarzbraun, Beschuppung des Halsschildes gleichmässig dicht und aus bläulich grauen Schüppchen bestehend (nicht wie bei *rufipennis* 2 Dorsalstreifen bildend), mässig dicht und grob punktiert, die Punkte mit Börstchen auf dem Grunde, Flügeldecken entfernt und ziemlich grob gereiht-punktiert, die Entfernung der einzelnen Punkte von einander ungefähr so gross wie die Punkte selbst, die Spatien klein und entfernt beborstet gekörnelt nur sehr wenig breiter wie die Punktreihen, die mässig dichte Beschuppung aus kleinen runden, gräulichen Schüppchen bestehend, von denen ungefähr 3–4 auf einer Spatiumbreite Platz finden. Unterseite des Körpers dichter grünlich weiss beschuppt, 1. und 2. Ventralsternit grob und entfernt punktiert, die Punkte mit gebogenem Börstchen. Schenkel unterseits im mittleren Teil mit undeutlich gereihten sehr kleinen Dörnchen.

Übersicht der philippinischen Pyrgops-Arten.

- a^1. Grösste Breite des Halsschildes in, oder nahe der Mitte, Körperfärbung ganz schwarz, oder schwarz mit hellen Schuppenmakeln, Beine zuweilen rötlich.
  - b^1. Halsschild ohne hell beschuppte Mittellinie.
    - c^1. Flügeldecken zwischen den Körnerreihen überall mit gräulichen Schüppchen bedeckt, nur beiderseits hinter der Mitte mit einer schrägen, glänzenden Seitenmakel.. inops Boh. (=cyanipes Chevr.)
    - c^2. Flügeldecken mit hell beschuppter Basalquerbinde, zuweilen auch eine Makel in der Mitte der Halsschildbasis sowie die hintere Hälfte der beiden äussersten Spatien und eine Makel an der Deckenspitze hell beschuppt .... 68. stellata var. aurocincta nov.
  - b^2. Halsschild mit hell beschuppter Mittel- und Seitenlinie, Flügeldecken mit zerstreuten hellen Schuppenpunkten .... 67. stellata sp. nov.
- a^2. Grösste Breite des Halsschildes vor der Mitte, Grundfärbung des Käfers rotbraun oder dunkelbraun.
  - d^1. Halsschild mit 2 dorsalen Schuppenstreifen........ 69. rufipennis sp. nov.
  - d^2. Halsschild ohne Schuppenstreifen .... 70. exigua sp. nov.

SCYTHROPIDÆ.

71. **Isopterus**[20] **acanthomerus** sp. nov. (Taf. I, Fig. 11.)

Niger, parce albido-setosus, pedibus, praesertim femoribus ad basin, interdum totis, rufescentibus; antennis sat robustis rufescentibus; rostro latitudine longiore, lateribus basin versus paulo convergentibus, dorso planiusculo, medio subconcavo, distincte, lateribus substriatim punctatis, fronte inter oculos puncto impresso; prothorace latitudine longiore, nitido, sat parce punctato ac minute remoteque albo-squamuloso, lateribus aequaliter rotundatis; elytris oblongo ellipticis, subtile denseque subseriatim punctatis in dimidia parte antica vitta marginali, interdum cum fascia dorsali, arcuata, conjuncta albo-squamosis; femoribus clavatis, posticis subter spina armatis.

Long. 12–12.5, lat. 3–3.2 mm.

Patria: LUZON, provincia Benguet, mons Pulog, legit *H. M. Curran*. (Bur. Sci. Acc. No. 10259).

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[20] Faust, *Ent. Zeitg.* Stett. (1895), 56, 4.

Schwarz, die ganzen Beine, oder doch wenigstens die Schenkelwurzeln, meist auch die Fühler rot, überall fein und sparsam behaart, ausserdem mit sehr kleinen, zerstreuten grünlich weissen Schüppchen, die nur in der hinteren Hälfte des Deckenseitenrandes, zuweilen auch in Form eines bogenförmigen Querbandes hinter der Deckenmitte verdichtet sind.

Rüssel länger als breit, seine Seiten nach hinten zu etwas konvergierend, der Rücken fast eben, nur leicht eingedrückt, ziemlich kräftig punktiert, nach den Seitenrändern zu etwas längsrunzelig. Stirn zwischen den Augen mit Längsgrübchen. Fühler dunkelrot, ziemlich kräftig. Schaft geschwungen, 1. und 2. Geisselglied verlängert, das 2. wenig länger als das 1., die folgenden gestreckt kegelförmig, das 3. Geisselglied wenig länger als das 1. Halsschild länger als breit, die Seiten gleichmässig und schwach gerundet, oberseits ziemlich kräftig, aber mässig dicht punktiert, die meisten Punkte entweder mit einem sehr kleinen runden Schüppchen, oder feinem, mit der Spitze nach der Mittellinie zugekehrtem Härchen. Flügeldecken in den Streifen und Zwischenräumen fein und ziemlich dicht, neben der Naht etwas gereiht-punktiert, die äussersten 2 Streifen punktiert gestreift, in der hinteren Deckenhälfte furchenartig eingedrückt, die Zwischenräume daselbst glatt, während sie auf der Deckenscheibe neben der Punktierung noch eine feine Querrunzelung aufweisen. Wie auf dem Halsschild tragen auch die Punkte der Decken entweder ein feines weissliches Härchen oder ein kleines grünliches Schüppchen. Das vorletzte Spatium ist über der Hinterbrust erweitert von den Hinterhüften ab meist dichter und mit länglichen weissen Schüppchen bedeckt, ungefähr über dem Hinterrande des 1. Bauchsegmentes entsendet dieser Randstreifen eine im Bogen nach der Nahtmitte sich wendende, meist makelartig unterbrochene grünliche Schuppenquerbinde, die aber zuweilen auch fehlen kann. Beine dunkelrot, die gekeulten Schenkel an der Wurzel heller und mehr gelblich, die hinteren unterseits hinter der Verdickung mit ziemlich langem nach hinten gebogenen Dorn. Beine, sowie die Körperunterseite sparsam weisslich behaart.

Mir liegt ausser dieser noch eine andere sehr ähnliche Art vor, bei der das Halsschild zwischen den Schuppenpunkten viel gröber punktiert ist, die Decken dichter und mehr fleckig beschuppt und die Beine ganz schwarz sind. Leider ist das einzige Exemplar so schlecht erhalten dass ich es unterlassen muss, auf dieses eine neue Art zu errichten.

ATERPIDÆ.

72. **Aesiotes notabilis** Pasc. var. **sanchezi** nov.

Differt a specie typica[21] squamositate concolore ferruginea in elytrorum parte declivi et in femorum parte apicali dilutiore.

Patria: LUZON, provincia Benguet, Baguio, legit *F. Sanchez* S. J., et Negros Occ., Bago, legit *Charles S. Banks*.

Ob *Aesiotes notabilis* und *leucurus* Pasc.[22] tatsächlich verschiedene Arten und nicht nur Farbenvarietäten einer Art sind, erscheint mir sehr fraglich, da plastische Unterscheidungsmerkmale nicht angegeben werden. Die in 2 Stücken von den Philippinen vorliegende Form stimmt in Grösse und Skulptur ausserordentlich mit mir vorliegenden Stücken von *notabilis* aus Queensland überein, die man der Beschreibung nach ebenso gut zu *leucurus* Pasc. stellen könnte. Pascoe bemerkt bei letzterem: „very destructive to introduced conifers."

Beide philippinischen Exemplare sind einfarbig, rostrot, stellenweise metallisch schimmernd, nur der abschüssige Spitzenteil der Decken und die Spitze der Schenkel sind heller.

Das Vorkommen dieser den Aterpiden zugezählten Gattung auf den Philippinen ist sehr interessant und bemerkenswert und findet vielleicht seine Erklärung darin, dass die Art mit Nutzholz aus Australien nach Luzon und Negros eingeschleppt worden ist.

HYLOBIIDÆ.

73. **Pagiophloeus** (?) **schultzei** sp. nov.

Niger, robustus, palpis ferrugineis, P. pacca Fabr. affinis; rostro dorso subtricarinato, basi utrinque profunde sulcato; funiculi articulis 3°–7° transversis, tertio quarto minore, septimo tomentoso ac clava adnato; prothorace subconico, longitudine latitudine basali aequali, irregulariter fossulato, in medio tuberculo, ante tuberculum levigato, parce punctulata, pone tuberculum impressione oblongo, rude punctata; elytris prothorace multo latioribus, latitudine 1⅗ longioribus, seriato-punctatis, lateribus punctato-striatis, spatiis 4°–8° ad apicem callosis, spatio secundo pone basin tuberculo oblongo; corpore subter sat parce setuloso-punctato.

Long. (rostro haud computato) 17, lat. 7 mm.

Patria: LUZON, provincia Rizal, Montalban Gorge, legit *W. Schultze*. (Bur. Sci. Acc. No. 9114).

Auch diese Art bietet bei der Einreihung in die Faust'sche

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[21] Pascoe, *Journ. Ent.* (1866), 2, 422, Pl. XVII, fig. 16.

[22] *Ann. & Mag. Nat. Hist.* (1873), IV, 12, 278.

Hylobiiden-Tabelle (Ent. Zeitg. Stett. (1892), 201, Schwierigkeiten.[23] Habituell steht sie dem *Pagiophloeus pacca* Fabr. sehr nahe, unterscheidet sich aber von dieser Gattung durch die nur sechsgliedrige Geissel, das 7. Geisselglied ist nämlich sowie die Keule tomentiert und dicht an diese geschlossen. Zur Zeit dürfte es nicht angebracht sein auf dieses Merkmal allein eine neue Gattung zu gründen.

Gestalt und Grösse ganz von *Pagiophloeus pacca* Fabr., schwarz, ziemlich glänzend, Maxillartasten rotgelb, die Decken in der Mitte zuweilen mit einer Schrägbinde und an der Spitze mit einer Makel, die von einer gelblich weissen Wachsausschwitzung gebildet werden. Rüssel ziemlich gerade, die Seitenfurchen vor den Augen so breit wie die Fühlerfurche, Rüsselrücken in der Mitte mit 3 feinen Leisten, die beiderseits von an der Wurzel grubig vertieften und da einander zusammenstossenden Furchen begrenzt werden. Stirn mit zerstreuten feinen, über den Augen mit gröberen, tieferen Punkten. Halsschild so lang wie an der Basis breit, die Seiten in den basalen 2 Dritteln wenig, im vordersten Drittel deutlich nach vorn konvergierend, Basalrand zweibuchtig, Apikalrand schwach bogig vorgezogen, Oberseite mit grossen, unregelmässigen länglichen Gruben, nur die Hinterecken und die Mitte des Vorderrandes in grösserer Ausdehnung glatt, Mitte der Scheibe mit einem, seitlich etwas zusammengedrückten Höcker, hinter diesem ein dicht und grob punktierter Längseindruck. Schildchen ungefähr so lang wie breit, halbelliptisch. Flügeldecken 1⅝ mal so lang wie breit, breiter als das Halsschild, mit zehn Punktreihen, von welchen die 3 äussersten deutlich gefurcht sind und der 4.–8. vor der Deckenspitze eine hinten durch einen Eindruck begrenzte Endbeule bilden (namentlich das Ende des 4. Spatiums tritt stark vor). Punkte der Streifen länglich, die des 1. und 2. Streifens deutlich schmäler als die Spatien, die des 3. bis 6., namentlich an der Deckenwurzel breiter als die Spatien, die des 8. und 9. Streifens wieder kleiner. Zweites Spatium nahe der Wurzel mit einem länglichen Tuberkel. Nahtstreifen an der Spitze etwas stumpf vorgezogen. Unterseite sparsam, das Abdomen überdies auch feiner behaart-beschuppt, das Analsegment zwischen den Punkten undeutlich querrunzelig. Schenkel gekeult, sparsam und fein, die Tarsen dicht weisslich behaart.

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[23] Faust hat in dieser Tabelle wenig Glück mit der Gruppierung der Merkmale gehabt, auch fehlt in ihr die vorher auf Seite 50 in Vorschlag gebrachte Gattung *Pseudaclees*. Seite 201 in der elften Zeile von oben muss es *dreigliedrige*, statt *eingliedrige* Keule heissen.

74. Dyscerus [24] unifasciatus sp. nov.

Rufo-ferrugineus, parce subtiliterque ochraceo-setulosus; rostro in dimidia parte basali crebre rudeque striato-punctato, dorso carinula mediana tenui; prothorace longitudine latitudine aequali, lateribus in duabus trientibus basalibus parallelis, crebre punctato, punctis setuligeris; elytris latitudine $1\frac{2}{3}$ longioribus, pone medium utrinque lunula nigra, transversa, fortiter decies striato-punctatis, lateribus striatis, punctis subquadratis, in aversum diminuentibus, in disco latitudine spatiis fere aequalibus, spatiis apicem versus subtile remoteque seriato-granulatis, metasterno abdomineque nigris, illo rude, hac remotius ac subtilius setuloso-punctatis; femoribus clavatis, dente armatis, tibiis anticis arcuatis, ungue atque spina interna armatis.

Long. (sine rostro) 7–8, lat. 2.8–3 mm.

Patria: LUZON, provincia Rizal, Montalban Gorge, legerunt *Charles S. Banks* et *W. Schultze* (Bur. Sci. Acc. No. 5464 et 11061).

In seiner Übersicht der Hylobiiden-Gattung [Ent. Zeitg. Stett. (1892), 201] bringt Faust alle Gattungen der Hylobiiden durch das Merkmal: „Innenecke der Schienenspitze ohne Dorn, nur mit zwei Haarzipfeln" in Gegensatz zu der einzigen, chilenischen Gattung *Calvertius* Sharp, wobei er übersieht, dass auch *Hylobius alpheus* Reiche die Innenecke der Schienenspitze ähnlich wie *Calvertius* mit einem Dorn bewehrt zeigt. Auch die Weibchen von *Hylobius exsculptus* Roelofs, sowie die Arten der Gattung *Porohylobius* [25] haben am Innenrande der Vordertibien einen Dorn, ferner hat auch Champion darauf hingewiesen [Biol. Centr. Amer. (1902), Pt. 4, 4, 8], dass bei gewissen *Heilipus*-Arten entweder nur die Weibchen oder beide Geschlechter neben dem Endhacken einen Dorn an den Schienen haben.

Dieses von Faust in den Vordergrund gestellte Merkmal ist demnach zur Scheidung der Hylobiiden-Gattung nicht zu verwenden, was deshalb nötig war vorauszuschicken, als der hier beschriebene *Dyscerus unifasciatus* der sonst dem *macilentus* Boh. und *cruciatus* Faust der Faust'schen Sammlung sehr nahe steht, im Gegensatz zu allen bisher bekannten Arten der Gattung einen Dorn an der Spitze des Vorderschieneninnenrandes aufweist. Trotz dieser Abweichung stelle ich die neue Art zu

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[24] Faust, *Ent. Zeitg.* Stett. (1892), 198.

[25] Die von Faust auf Seite 50 aufgestellte Gattung *Pseudaclees* fehlt in der von ihm später, Seite 201, gegebenen Tabelle der Hylobiiden, ebenso natürlich die 1894 in den *Ann. Mus.* Genova, 34, 229, beschriebene Gattung *Porohylobius*.

Dyscerus, da alle anderen Merkmale mit dieser Gattung übereinstimmen.

In Grösse und Gestalt dem *Dyscerus macilentus* Boh. und *cruciatus* Faust ähnlich, aber heller rotbraun, die Decken hinter der Mitte mit gebogener, ihre Convexität nach vorn kehrender schwarzer Querbinde. Rüssel so lang wie das Halsschild, leicht gebogen und relativ dick, mit feiner Mittelleiste, in den basalen 2 Dritteln dicht und etwas runzelig punktiert-gestreift, die Punkte mit kurzen Härchen, Rüsselspitze fein punktiert. Augen bis auf Schienenbreite innen genähert. 1. und 2. Glied der schwärzlichen Fühlergeissel verlängert und gleich lang, die folgenden 2 kaum länger als breit, das 5. so lang wie breit, das 6. und 7. leicht quer, kegelförmig, letzteres zwar tomentiert, aber von der Keule gesondert. Halsschild so lang wie breit, an der Basis zweibuchtig, die Seiten in den Basalen 2 Dritteln parallelseitig. Halsschildoberseite dicht, nach dem Vorderrande zu sparsamer und feiner punktiert, die Punkte mit kurzen Börstchen auf dem Grunde, die Zwischenräume zu feinen Querrunzeln zusammenfliessend. Schildchen klein, ungefähr halbkreisförmig, etwas länger als breit. Flügeldecken 1⅔ mal so lang wie breit, 2½ mal so lang wie das Halsschild, grob gereihtpunktiert, in Basalteil der Decken die länglich viereckigen Punkte so breit wie die Spatien, nach hinten zu aber allmälig derartig kleiner werdend, dass in der Mitte der Decken die Spatien deutlich breiter als die Punkte sind, im Spitzendrittel zeigen die Spatien und zwar um so deutlicher, je mehr sie nach aussen gelegen sind, feine entfernt gereihte Körnchen. Die 3 vorletzten Spatien treten in der hinteren Hälfte etwas kielartig vor und enden mit einer Apicalschwiele. Jede Decke hinter der Mitte mit schwarzer, querer Bogenmakel, die vom 1. bis 6. Streifen reicht und ihre Convexität nach vorn kehrt. Hinterbrust und Abdomen schwarz, erstere an den Seiten sehr gross punktiert, in der Mitte mit Längseindruck, Abdomen feiner, nach der Mitte zu viel feiner und sparsamer punktiert, alle Punkte kurze Börstchen tragend, 1. Abdominalsternit auf der Mitte des Hinterrandes mit einem Grübchen (♂ ?). Beine rot, sparsam behaartpunktiert, Hinterschenkel die Spitze des Analsternites erreichend. Häufig zeigt diese Art an den Seiten des Halsschildes, an der Deckenspitze und vor der schwarzen Deckenquerbinde (hier in Form eines Querbandes) eine gelblich weisse wachsartige Ausschwitzung.

Von allen bekannten Arten der Gattung nämlich: *andrewesi* Hllr., *aphya* Pasc., *cervinus* Hllr., *consimilis* Fst., *crasirostris*

Pasc., *cribratus* Roelofs, *cruciatus* Fst., *elongatus* Roelofs., *fruhstorferi* Fst., *jordani* Fst., *lateralis* Hllr., *linnei* Fst., *macilentus* Boh., *notatus* Pasc., *proximus* Hartm., *sexpunctatus* Hartm., *sparsus* Hllr., *sparsutus* Hllr. und *virgatus* Fst. durch die erwähnte Vorderschienenbildung verschieden.

75. **Odosyllis mindanaoensis** sp. nov.

O. crucigera Pascoe major, albido-squamosa, prothorace plaga basali, elytris circum scutellum et pone medium infuscatis; clava tomentosa; prothorace in medio haud sulcato, plaga basali rotundata aequaliter granulosa; elytris apice sat longe spinosis, granulis seriatis in dimidia parte basali spatii secundi acervatis.

Long. 14–16, lat. 6.5–7.5 mm.

Patria: MINDANAO, Zamboanga, legit *W. J. Hutchinson* (Bur. Sci. Acc. No. 8693).

Grösser als *O. crucigera* Pasc.,[26] wie *intricata* Faust[27] durch an der Naht in eine Spitze ausgezogene Decken ausgezeichnet. Dicht schmutzig weiss beschuppt, die Beine, Seiten des Halsschildes, und die Decken hinter einer weisslichen Schrägbinde mehr lehmfarbig, eine runde Makel an der Halsschildbasis deren Durchmesser halb so lang wie die Halsschildmittellinie ist, eine grössere ebenfalls rundliche, die das 1. Drittel der Decken einnimmt und aussen den 5. Streifen tangiert, dunkler bräunlich beschuppt. Die basale Deckenmakel ist bei einem der mir vorliegenden 2 Stücke in der Mitte hell beschuppt, so dass das glatte schwarze, knopfartig vorstehende Schildchen von einem dunklen Ring umschlossen ist. Die Färbung der beiden Stücke weicht auch noch insofern von einander ziemlich ab, als sie bei dem dunkleren Stück scharf markiert und bei diesem ausserdem noch eine dunkle Postmedianmakel vorhanden ist, die dem anderen Stück fehlt. Doch stimmen beide in den charakteristischen plastischen Merkmalen überein. Rüssel glänzend glatt, nur beiderseits an der Wurzel fein punktiert. Fühlergeissel schlank, 1. und 2. und 5. und 6. Geisselglied ungefähr gleich lang, das letzte etwas breiter als lang, die tomentierte Keule so lang wie das 3., 4. und 5. Glied zusammen, relativ kürzer wie bei *crucigera*. Halsschild in der Basalhälfte so weit die dunkle Basalmakel reicht, und eine Querzone hinter dem Vorderrande, gleichmässig gekörnt, beiderseits der Basalmakel eine dicht weiss beschuppte, ungekörnte Zone, die aussen von einer unregelmässigen Körnerreihe, die hinten mit der Seitenrandkörnelung zusammenfliesst, begrenzt wird. Flügeldecken fein gestreift, die Wurzel, namentlich die des 5. Spatiums, eingedrückt, die Zwischenräume (die beiden äussersten nur an der Wurzel) entfernt und klein gereiht-gekörnt, die Körnchen ungefähr ⅕ so breit wie die Spatien und in der Basalhälfte des 2. Spatiums zu unregelmässiger Doppelreihe zusammengedrängt. Nahtspitze in einen ziemlich langen höckerigen Dorn ausgezogen. Unterseite dicht hell beschuppt, die Schenkel und Schienen mit kleinen glänzenden, weisse Borsten tragenden Körnchen besetzt. Halsschildseiten über den Vorderhüften ohne Körnchen.

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[26] *Ann. Mus.* Genova (1871), II, 2, 277.

[27] *Ent. Zeitg.* Stett. (1890), 75.

CALANDRIDÆ.

76. **Rhabdocnemis lineatocollis** sp. nov.

Ferrugineus, corpore subter, prothorace vittis tribus, duabus lateralibus latioribus, mediana ante abbreviata, lineiformi, elytris sutura, spatio quarto sextoque, lineola spatii secundi in medio et ad apicem, cano-tomentosis; spatiis 1, 2, 3 et 5 ad basin et pone medium 6, 7, et 8 totis plus minusve nigricantibus.

Long. (sine rostro) 9–14, lat. 3.8–5 mm.

Patria: LUZON (ex coll. *Dohrn*), PALAWAN, legit *Dr. Platen*, et BOHOL, legit *A. Celestino* (Bur. Sci. Acc. No. 6729).

Eine durch die schöne weissliche Linienzeichnung auffallende und leicht kenntliche Art, von braunroter Grundfärbung. Rüssel ungefähr so lang wie das Halsschild, gleichmässig gebogen, beim ♂ dicker als beim ♀, an der Wurzel dicht weisslich tomentiert, mit feiner glatter Mittellinie, vor der Fühlerinsertion löst sich die Tomentierung in nach vorn zu kleiner werdende und schliesslich verschwindende Tomentpunkte auf. Fühler matt schwarz, der Schaft höchstens so lang wie die Vorderbrust, vom Vorderrand bis zum Vorderrand der Vorderhüften gemessen, 2. Geisselglied gestreckt kegelförmig, länger als das 1. alle folgenden quer, nach der Keule zu an Breite zunehmend, letztere kurz eiförmig. Halsschild 1½ mal so lang wie breit, dicht innerhalb des Seitenrandes beiderseits mit breitem weisslichen Längsstreifen, in der Mittellinie mit vorn abgekürzter weisser Linie, ein Längsstreifen unterhalb des Seitenrandes und 2 vorn sich vereinigende, die weisse Mittellinie umfliessende Streifen, auf der Halsschildscheibe schwarz. Schildchen streifenförmig, weisslich. Flügeldecken am Basalrand etwas aufgeworfen, mit fein und entfernt punktierten Streifen, von denen der 4. mit dem 6. sich an der Spitze vereinigt und daselbst eingedrückt ist, die Naht, das 4. und 6. Spatium der ganzen Länge nach, das 2. nur an der Wurzel, in der Mitte, und an der Spitze weisslich tomentiert und mit feinen gereihten Börstchen, die übrigen Spatien teilweise schwarz, teilweise rot. Gewöhnlich beginnt die schwarze Strichzeichnung auf dem 3. Spatium an der Wurzel, auf dem 2. und 5. Spatium etwas hinter der Wurzel und bildet hinter der Deckenmitte auf dem 1., 2. und 3. Spatium eine ungefähr dreieckige Makel, das 6. Spatium ist meist in der hinteren Hälfte, das 7. ganz, das 8. nur vorn schwarz, im übrigen rötlich. In seltenen Fällen ist auch die weisse Tomentierung der Spatien in Gruppen von Tomentpunkten aufgelöst. Das schwärzliche Pygidium ist ziemlich dicht mit Tomentpunkten, die kurze Börstchen tragen bedeckt, die sich in der Mittellinie zu einen Mittelkiel verdichten. Die Unterseite zeigt neben dem dünnen grauen Toment noch ziemlich dichte borstentragende Tomentpunkte.

ERRATA.

Seite 300, Zeile 20 von unten, statt *tumoridorum* lies *tumoridorsum.*
Seite 320, Zeile 11 von oben, statt *scarcitis,* lies *sarcitis.*
Seite 322, Zeile 8 von oben, statt squamolis, lies squamulis.
Seite 331, Zeile 4 von unten, statt *nigras,* lies *nigrans.*
Seite 343, Zeile 4 von oben, statt *levicollis,* lies *laevicollis.*
Seite 348, Zeile 9 von oben, statt *coruleonotatus,* lies *coeruleonotatus.*
Seite 393, unterste Zeile, statt *crasirostris* lies *crassirostris.*

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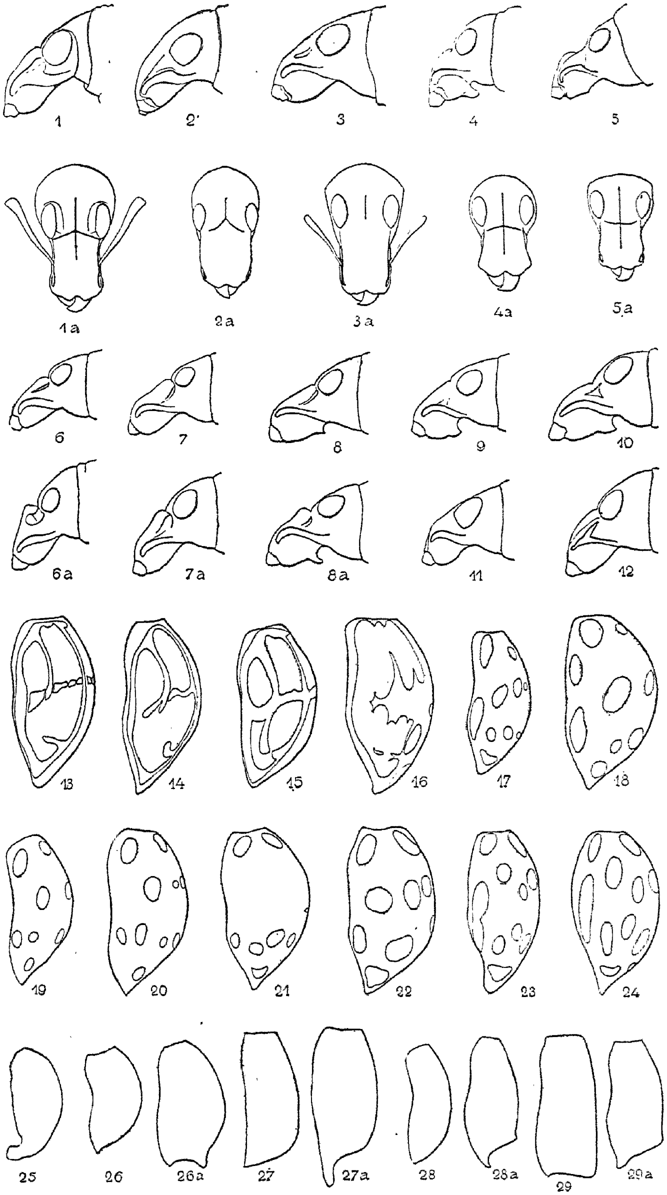
FIG. 1, 1a. *Apocyrtus inflatus* Er., Kopf von der Seite und von vorn.
2, 2a. *Pseudapocyrtus imitator* sp. nov., desgl.
3, 3a. *Macrocyrtus nigrans* Pasc., desgl.
4, 4a. *Artapocyrtus 4-plagiatus* Roelofs, desgl.
5, 5a. *Artapocyrtus pardalis* sp. nov., desgl.
6, 6a. *Metapocyrtus erichsoni* Chevr., Kopf von der Seite vom ♂ und ♀.
7, 7a. *Metapocyrtus rugicollis* Chevr., desgl.
8, 8a. *Metapocyrtus bituberosus* sp. nov., desgl.
9. *Metapocyrtus albodecoratus* sp. nov., Kopf von der Seite.
10. *Metapocyrtus picipennis* Waterh, desgl.
11. *Isopterus acanthomerus* sp. nov., desgl.
12. *Metapocyrtus pseudomonilifer* sp. nov., desgl.
13. *Pachyrrhynchus möllendorffi* Hllr. Umriss der linken Flügeldecke von der Seite gesehen.
14. *Pachyrrhynchus decussatus* Waterh., desgl.
15. *Pachyrrhynchus gloriosus* Faust, desgl.
16. *Pachyrrhynchus psittacinus* sp. nov., desgl.
17. *Pachyrrhynchus croesus* R. Oberth., desgl.
18. *Pachyrrhynchus perpulcher* Waterh., desgl.
19. *Pachyrrhynchus erichsoni* Waterh. ♂, desgl.
20. *Pachyrrhynchus eschscholtzi* Waterh. ♀, desgl.
21. *Pachyrrhynchus eques* sp. nov. desgl.
22. *Pachyrrhynchus sarcitis* Behrens, desgl.
23. *Pachyrrhynchus chlorites* Chevr., desgl.
24. *Pachyrrhynchus lorquini* Chevr., desgl.
25. *Pseudapocyrtus exsectus* sp. nov., ♀ desgl.
26, 26a. *Metapocyrtus tumoridorsum* Chevr., desgl. ♂, ♀.
27, 27a. *Metapocyrtus bambalio* sp. nov., desgl.
28, 28a. *Metapocyrtus recurvicauda* sp. nov., desgl.
29, 29a. *Homalocyrtus intermittens* sp. nov., desgl.

TAFEL II.

FIG. 1. *Pseudapocyrtus formicarius* sp. nov.
2. *Pseudapocyrtus imitator* sp. nov.
3. *Pseudapocyrtus schadenbergi* sp. nov.
4. *Neopyrgops banksi* gen. et sp. nov.
5. *Macrocyrtus subcostatus* sp. nov.
6. *Nothapocyrtus cylindricollis* sp. nov.
7. *Metapocyrtus albodecoratus* sp. nov.
8. *Eupachyrrhynchus superbus* sp. nov.
9. *Pachyrrhynchus nobilis* sp. nov.
10. *Pachyrrhynchus sanchezi* sp. nov.
11. *Pachyrrhynchus ochroplagiatus* sp. nov.
12. *Pachyrrhynchus circulatus* sp. nov.
13. *Metapocyrtus figuratus* sp. nov.
14. *Calidiopsis speciosa* gen. et sp. nov.
15. *Polycatus aurofasciatus* gen. et sp. nov.
16. *Metapocyrtus politissimus* sp. nov.



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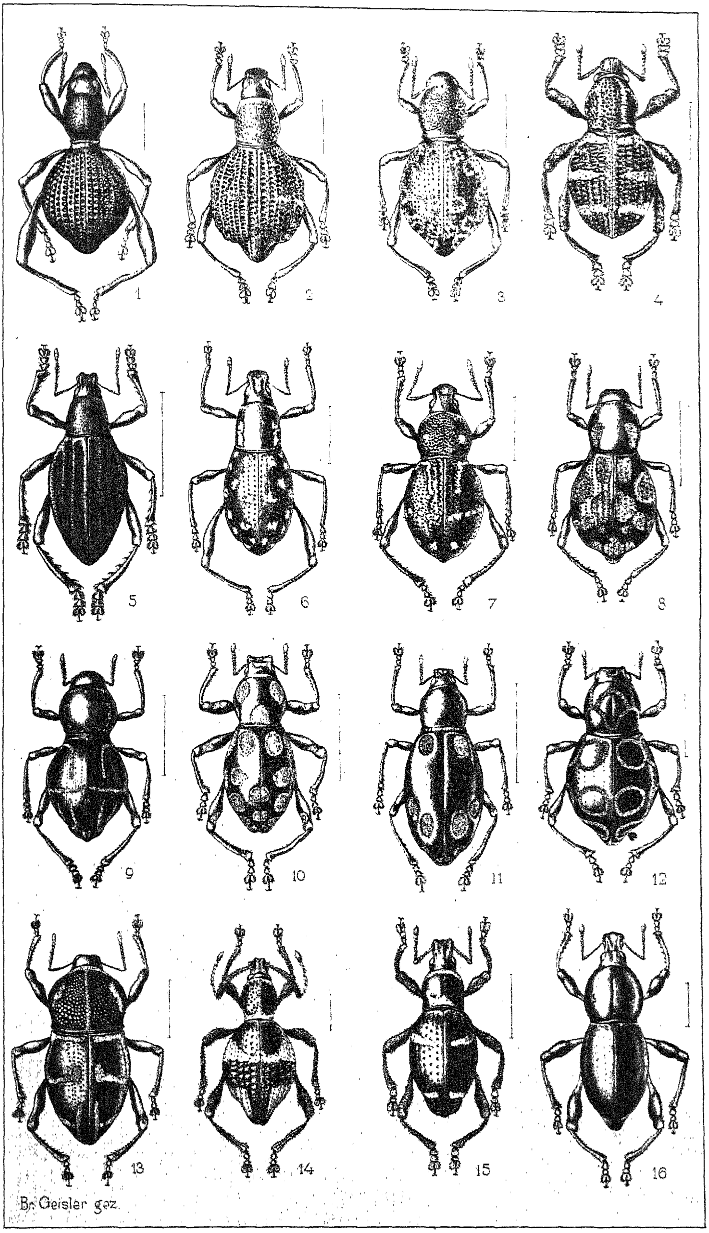
TAFEL I. PHILIPPINISCHE RÜSSELKÄFER.



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Paul C. Freer.

OBITUARY

Paul Caspar Freer

DIRECTOR OF THE BUREAU OF SCIENCE OF THE GOVERNMENT OF THE PHILIPPINE ISLANDS
DEAN OF THE COLLEGE OF MEDICINE AND SURGERY AND PROFESSOR OF
CHEMISTRY OF THE UNIVERSITY OF THE PHILIPPINES, AND
FOUNDER AND EDITOR-IN-CHIEF OF THIS JOURNAL

We are deeply grieved to announce the death of Doctor Freer at Baguio, Philippine Islands, on April the seventeenth, in his fifty-first year, from arterio-sclerosis and acute nephritis.

In an effort formally to express our sorrow and to honor his memory a memorial meeting of the members of the Staff of the Bureau of Science, the Council of the University of the Philippines, and the members of the Philippine Islands Medical Association was held on July 1, 1912. The addresses delivered at this memorial meeting are published in this number.

At a meeting of the members of the Staff of the Bureau of Science, held on the eighteenth day of April, the following resolutions were adopted:

Whereas it has pleased Almighty God in His Wise and Inscrutable Providence to remove from our midst Paul Caspar Freer, M. D., Ph. D., Director of the Bureau of Science of the Government of the Philippine Islands, since the time of its organization as the Bureau of Government Laboratories in the year 1901, Dean of the College of Medicine and Surgery, and Professor of Chemistry, University of the Philippines, and Founder and Editor-in-Chief of the "Philippine Journal of Science," who, for many years, has been our Leader, Counselor, and Friend; and

Whereas at best we can do little to indicate at this time our real appreciation of him as a man and as a worker for the general good: Therefore be it

Resolved, That we, the Members of the Staff of the Bureau of Science in Manila, Philippine Islands, do hereby express our deepest sorrow and keen feeling of personal loss in the death of Doctor Freer; and be it further

Resolved, That he holds a place of highest respect, admiration and appreciation both officially and personally in the hearts of all of us, and especially of those who were most intimately associated with him in scientific work; and be it further

Resolved, That it is the sense of the Members of this Institution that the Bureau of Science has suffered a very great loss and that the cause of Science in these Islands has been deprived of one of its most zealous and conscientious advocates; and be it further

Resolved, That we extend our sincere sympathy and condolence to his Widow in her overwhelming grief, to his Sister, Brother and other Relatives; and be it further

Resolved, That copies of these resolutions be engrossed and sent to the bereaved Widow and Brother of Doctor Freer, and that they be filed in the Archives of the Bureau of Science, transmitted to the Bureau of Civil Service, published in the forthcoming Number of each Section of the "Philippine Journal of Science," in the newspapers of Manila, in a paper in the City of Chicago, Doctor Freer's birth-place, and in "Science," the Official Organ of the American Association for the Advancement of Science, of which Doctor Freer was a Fellow.

For the Staff of the Bureau of Science:
RICHARD P. STRONG,
CHARLES S. BANKS,
E. D. MERRILL,
[L. S.] ALVIN J. COX,
OSCAR TEAGUE,
A. E. SOUTHARD,
Committee.

At Manila, Philippine Islands, this eighteenth day of April,
in the year of our Lord one thousand nine hundred and twelve.

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THE PHILIPPINE JOURNAL OF SCIENCE

In Memoriam

PAUL CASPAR FREER

BUREAU OF SCIENCE
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THE LIFE AND CAREER OF DOCTOR FREER.

By Martin Egan,
Editor of the Manila Times.

When Doctor Musgrave asked me to come to this memorial gathering and sketch in brief the life and career of Paul Freer, my first thought was to ask him to excuse me from a task so painful. I knew that if I did so I must bare my heart in sorrow for my friend who has gone and then I realized that we would all be here to-day with our hearts bared in sorrow, that no man need hide his heart in such a communion of friendship in grief, and so I come to take my place among those chosen to pay tribute to the memory of the good man whom we have lost from our councils, the friend passed from the narrowing circle. Paul Freer descended of a line worthy of him, its product, he worthy of his lineage. His father was a man of scientific attainments, who gave his life in that noblest aim of science, the saving of human life; his mother, a scholar, a linguist, of high culture, of rare mind, and compelling maternal love for the well-being of her children. The elder Freer, born in New York of an old family of Dutch extraction, settled in Chicago, then a scattering town of 7,000, and entered upon the practice of medicine. He quickly advanced to leadership in the growing city, and became president of Rush Medical College which he had helped to found. Overwork in a severe epidemic of typhoid fever that swept the city led to his breakdown and death, and the care and education of his children, including him whom we honor and mourn to-day, passed to the widow and mother. Mrs. Freer, his mother, was born in Württemberg and as a girl went to New Orleans to make her home with her uncle. Herself an advanced student, she devoted herself assiduously to the education of her children. It is related of the family that it was a rule to conduct table conversation in Latin, French, or German and that good books were the first of its household gods. It was in this wholesome and stimulating atmosphere that Paul Freer received the first inspiration for study and investigation that was the compelling influence of his whole career. He was taken to Germany as a child for his rudimentary training, and he was destined to go there again to complete his education and receive from the Germanic school his chief methods and ideals in science, in education, and in general thought. Returning to Chicago, he entered the high school and when his class was graduated he stood at its head, the first student of the school. He had already determined to follow in the footsteps of his father, and from high school he entered Rush Medical College and began the study of medicine and surgery. It was at Rush that chemistry with its wonders and unsolved mysteries made its great appeal to his opening mind. He learned its rudiments at the feet of Professor Haines, well remembered as a sound scholar and instructor, and there resolved to specialize in it. He continued his medical work and graduated with the class of 1882, still a year under the age of 21. Germany was then leading the world in science and it appealed to the young student with all the forces of enthusiasm and instinct for he had the blood of the Fatherland in his veins. He determined to go to Munich and join the classes under the great von Baeyer, then the leading chemist of Europe. The choice proved a happy one for there grew a great and lasting friendship between the master and student that was deep in its influence upon the career and work of the younger man. I have recently seen a letter from Doctor Schieffelin, himself an eminent American physician, who went to Munich the year Paul Freer graduated and took his high honors, and in it he wrote:

> When I went to Munich in 1887 to study chemistry, I found that Professor von Baeyer, probably the most eminent chemist living, and the laboratory chiefs were all full of the praises of Paul Freer who had just taken the degree of doctor of philosophy, *summa cum laude*, which I believe was the first time a foreigner had achieved this distinction. And for twenty-five years I have watched with interest and pride his service to science and the government. He was an American gentleman of the highest type and of a charming personality.

Our departed friend has talked to me many times of those golden days at Munich, and I have always believed that they gave him the perfection of his ideals and logic and the soundness of his methods and thought and work. He left Munich fully equipped for work, and for a brief period labored and studied in England, first in the private laboratory of Sir William Perkin, where he devoted himself to analin dyes, and later at Owens College, Manchester, where he was an assistant instructor. But his desire was to return home, and when Tuft's College offered him a place he gladly accepted. But he was not to remain there. The faculty of the University of Michigan had heard of his ability and rising fame and offered him a larger field and scope of work. He went to Ann Arbor as lecturer in 1889 and a year later was honored with the professorship of inorganic chemistry, with a chair in the Medical School as well as in the School of Arts. It has been testified by many that Paul Freer brought to Michigan a wonderful stimulus for original work. He had the high ideals of the German university, less known and understood then in our American universities, he had the enthusiasm of youth, and he had ability as his commanding talent. He was impatient of mediocrity, and gave the best of himself to the earnest worker, the advancing student who came to him for instruction and guidance. His seriousness amounted at times to austerity, but it produced results and was in keeping with the high standard of scholarship of the members of the faculties at Michigan. In 1895 the University of Chicago sought his services, offering him a professorship of chemistry, but he declined the flattering offer, electing to stay where he was accomplishing so much good work. There he remained until 1901, when the United States Government gave him a chance for service in this field, so rich in opportunity for practical scientific work. He accepted the task, and here are written the last and greatest chapters of his life. You know them perhaps better than I. I was his personal friend and could share but little in the multiplicity of his official and professional activities, many of you were of them with him. I do know that we meet to-day in one institution and are surrounded by others that are to a large extent monuments to his ability and service. In whole or in part they were born in his mind, shaped by his thought and plans, projected upon his knowledge, constructed with his advice, and administered by his direction and counsel. You who have shared with him in this work may well be proud for here humanity suffering is hourly served.

I have known no man better equipped for his place and part in life than Paul Freer. He was born for his profession and crowned natural equipment with the best education and training that the world can give. He was an advanced investigator. He sought the truth and he entered the house of truth with open mind, without prejudice or fear. His industry bore constant fruit. He had the rare quality of detachment. He could drop the cares and burdens of administration for the laboratory or the literature of science, in both of which he gained distinction. His talents were of wide range, his industry boundless, his service faithful. He was a true friend.

To his widow, his kinsmen, his friends there is left a rare consolation. He did a man's work, and that is the best record that any of us may hope to carry to the Master of sciences.

PAUL CASPAR FREER, HIS INFLUENCE UPON OTHER MEN.

By Charles H. Brent,
Bishop of the Philippine Islands.

There are two distinct, though not mutually exclusive, types of influence exerted by men upon their fellows: that which is let loose by conscious volition, and that which is automatically given off by inherent virility, just as perfume is exhaled by the flower. The former focuses certain powers to achieve a given end and then relaxes, like the fitful spouting of a geyser; the latter is a milder though more consistent flow, like the bubbling of a perennial spring: the former aims at, and succeeds in making, an impression; the latter naturally and simply creates an atmosphere.

Both types of influence are necessary and valuable, but of the two the most potent and constant is that unconscious pressure of the whole personality which was characteristic of Paul Caspar Freer. If, on occasions, he could effectively impress a companion in accord with definite determination, it was because he possessed the consistent background of cultured manhood.

It is chiefly men with an imperfect education who find it necessary to be vociferous and theatrical in their efforts to influence others. They fret and scheme, and are never wholly themselves. But the man who is highly educated, that is to say, who, like Doctor Freer, has established many points of contact with nature, animate and inanimate, enjoys a repose which in itself is power. His composure was, doubtless, sometimes disturbed, else he would have been less than a man, but ordinarily he left you with the feeling that life was too good to allow of haste, too safe to justify panic, too sacred to tolerate scheming.

His versatility was such as to make a pleasant companion, full of surprises. Now it was some detail of scientific knowledge which slipped out of his well-stored mind, not as instruction pedantically imparted, but as the unpremeditated expression of his thought; now a reminiscence of the Tyrol, or an anecdote of Chopin, called up by some strain of classical music to which he was devoted.

Almost the last glimpse I had of him was on the golf course. His lank form was striding over the links with that abandon and freedom which denote complete absorption in a pursuit. It was indicative of his entire life. He traveled hopefully, joyously, whether in the quiet retreat of the laboratory, or through the mountainous home of Igorot and Calinga, or in the valley of the shadow of death.

Strong personalities never seem more alive than in that gloaming which succeeds life's sunset. They refuse to die. Their littlenesses drop out of sight, and the full force of their true character influences us. That Paul Caspar Freer lives yonder with God in the conscious enjoyment of manhood not quenched but vivified through the discipline of death, who dare doubt? But he also lives as an influence rather than a memory among us men whose hands are still busied for a short while with the affairs of here and now. Personality can not die even if it would.

DOCTOR FREER AND HIS GENERAL INFLUENCE UPON SCIENTIFIC WORK IN THE PHILIPPINE ISLANDS.

By RICHARD P. STRONG,

Chief of the Biological Laboratory, Bureau of Science.

We are here to honor the memory of a faithful and able worker, an earnest teacher, a loyal son of this Government, and a good and kindly friend. Paul C. Freer has left behind him a record of work well performed and, to those of us who knew him, the memory of a well-spent life. Although the real achievement of every great man of science lies particularly in his original contributions to science, and Doctor Freer's publications will be told of by others who are here to-day, for those who have formed their image of him largely through his writings I shall try to relate a few of the details of his scientific career and of how he moved among his fellow workers in his daily life; for, since he came to these Islands, I have, perhaps, been more closely associated with him in his work than any one else.

To him belongs the great merit of having been the pioneer in the general scientific work of the Government of these Islands. For more than ten years he has encouraged in every way at his command the cultivation of these scientific branches, and, since the establishment of the Bureau of Science and of the College of Medicine and Surgery, has unselfishly devoted his time to the best interests of these institutions. Indeed, there has been practically no scientific movement of value in these Islands since his arrival in which he has not been interested or has not taken an active part. Though, when he first began his work among us, chemistry was the branch of knowledge to which his mind most distinctly inclined and the one in which he took the greatest interest, nevertheless, on assuming the directorship of the Bureau of Science, he threw himself into the work of its organization and development with an energy, industry, and ability that could not fail to bring success to his efforts. In this Bureau, with its various divisions, biology (including medicine, general biology, botany, and entomology), chemistry, mining, ethnology, ornithology, and fisheries, there was not one division in the work and development of which he did not take a deep interest, and, more than this, he knew what work was being carried on in each division and much of its value. Moreover, he planned and followed with great interest and attention, born of a clear insight and knowledge of chemical problems, practically all of the investigations carried on in the chemical laboratory. In this remarkable breadth of interest and in the comprehensiveness of his knowledge he will always hold a unique position in the history of scientific work. It is not too much to say that no bureau chief in these Islands ever had the welfare of his bureau more at heart than Paul C. Freer and none have fought harder and with a greater persistence than he did to secure the annual appropriation from the Government, necessary to carry on the scientific work here. With all this, and apart from his natural ability, he brought to the Bureau and maintained there an exalted professional standard. Nevertheless, his directorship in this institution has been arduous and complex and has required the exercise of the very highest qualities of the mind.

One of his early aims was the establishment of a scientific journal to be published by the Bureau of Science, and this was accomplished as soon as the necessary legislation was enacted by the Government. In this journal (The Philippine Journal of Science), of which he was the editor, he took a remarkable pride and interest. He was an editor in every sense of the word, and but few realize the number of hours he spent at this work, preparing manuscript for the printer. Often have I found him at home on his holidays with a large pile of articles by his side, and sometimes he would spend many hours of the day correcting and rewriting poorly prepared manuscript with a patience and good nature that was truly remarkable. However, the ripeness of his critical judgment and the facility of his literary taste made most of this work easy for him, and not infrequently he earned the gratitude of some young author by having caught the spirit of his clumsily and illy-expressed ideas and transcribed them for him into terse and lucid language. His work of this nature was ever done with the conscientious desire to benefit the writer to the greatest degree. By the majority of the scientific staff of his Bureau he was particularly admired not only for the things which he had done in science, and not only for his intellect and for the wide grasp of his mind, but also for his fairness of judgment in all scientific matters and for his love and appreciation of scientific truth. In all the little disputes in his laboratory, he evidently endeavored never to let himself be led away by his personal feelings, but to give his decision in an impartial manner. His attitude finally inspired, among many of his colleagues, a confidence that he would judge their differences calmly and impartially, and there existed an intellectual bond between him and many of his laboratory workers. In the latter years of his life, his personal judgment of men and things was extensively sought after and his advice cheerfully and unselfishly given. I never knew him so busy with his own work that he would not willingly be interrupted by a colleague who wished to discuss with him some scientific problem or who sought his aid or advice. At such times it ever seemed to be his earnest desire to give the most efficient assistance to those who so came to him.

If we attempt to analyze his success, if we ask ourselves what were the qualities of his mind and character (for the two can not be separated in an investigator) by which he stood above many of his colleagues, we shall find as conspicuous traits, his comprehensive knowledge of scientific problems in general, his diligence and accuracy in the details of daily life, and his wholly upright and open character in all scientific matters. These traits were certainly powerful factors in contributing to his successful career.

However, my effort to-day is not only to pay a deserved tribute to the memory of one in whom energy and industry were prominent traits of character and who was always so loyal a friend to his colleagues in their scientific work, but also to point out the importance of his labors in an educational way and to emphasize the importance of his establishment of a scientific institution in which the criteria of the true spirit of inquiry were always insisted upon.

Finally, his life must ever serve as a beacon to those of us who strive to emulate faithful devotion to duty.

DOCTOR FREER AND THE BUREAU OF SCIENCE.

By Dean C. Worcester,

Secretary of the Interior of the Government of the Philippine Islands.

At the time civil government was established in the Philippine Islands, there fell to my lot the drafting of legislation which had for its object the establishment of scientific work upon a firm and lasting foundation.

As a member of the zoölogical staff of the University of Michigan, I had had abundant opportunity to learn by practical observation how such work should *not* be carried on. This institution supported a zoölogical department and a medical college. In the zoölogical department we taught among other things the zoölogical half of a beginner's course in general biology, the anatomy of the cat, comparative anatomy, the embryology of the chick, and comparative embryology. In connection with these courses we operated the necessary laboratories, and for purposes of reference we had a very incomplete library.

In the medical college there were a histological laboratory, a pathological laboratory, a so-called hygienic laboratory which was in reality a bacteriological laboratory, and an anatomical laboratory.

The pathologist maintained that it was necessary for him to teach his students normal histology because the histologist did not know his business and students could not appreciate pathological conditions of tissues until thoroughly familiar with such tissues in their normal state. Similarly the histologist felt called upon to teach his students pathology because of the supposed incompetence of the pathologist. Each had trouble with bacteriologists over questions as to where histology and pathology left off and bacteriology began. At the outset only human anatomy was taught in the anatomical laboratory, but later the anatomist in charge felt called upon to inaugurate other work in mammalian anatomy and in comparative anatomy as well. The histologist ultimately branched off into the embryology of the chick and began to talk about giving courses in comparative embryology.

Here then, within the limits of a single institution, I had observed no less than five different laboratories, each with its staff of instructors, its library, its expensive instruments, apparatus, and reagents; each more or less undermanned and inadequately equipped; each duplicating or striving to duplicate work carried on in one or more of the others. The result was needless expense, lack of readily obtainable efficiency, and constant bickering.

Furthermore, there had come to my attention rather startling instances of the duplication of scientific work in the departments at Washington.

While the complete lack of adequate facilities for carrying on imperatively necessary biological and chemical work which confronted us when civil government was organized in the Philippine Islands was appalling, I was nevertheless inclined to derive comfort from the old saying "Blessed be nothing," for we had at least the opportunity to *start* right, unhampered by costly but antiquated equipment, by worthy but incompetent investigators, or by quarrels as to who should do what needed to be done.

The materials with which to concoct a muddle worse than any of those with which I was already familiar lay ready to hand. At one time or another the Bureau of Customs has wished to establish a chemical laboratory and a so-called "microscopic laboratory." The Bureau of Forestry has thought that it needed laboratories for chemical, botanical, and entomological work. The Bureau of Agriculture has urged precisely similar needs and has desired to take up bacteriological and pathological work as well. The original Board of Health and its successor, the Bureau of Health, have been disposed to demand laboratories in which to conduct both routine work and original investigations in chemistry and biology. And so on to the end of the chapter.

I early decided to make a determined effort to centralize the laboratory work of the Insular Government under the control of one man, to the end that unnecessary and wasteful duplication of staff and equipment might be avoided and that maximum efficiency might be attained at minimum cost. With these ends in view, I drafted, and on July 1, 1901, secured the passage of "An Act providing for the establishment of Government Laboratories for the Philippine Islands." The passage of this Act laid a reasonably broad foundation, but did nothing more. It was necessary to plan and construct a modern laboratory building which should afford adequate facilities to meet the then existing, and probably future, needs of the Government; to list, buy, house, and properly catalogue a fairly complete scientific library; to purchase and install costly and complicated scientific apparatus; to provide seasonably a formidable array of expendable reagents and supplies; and most important of all, to secure the services of a large staff of well-trained scientists, capable not only of performing necessary routine examinations with unfailing accuracy, but also of grappling with some of the many scientific problems whose early solution was then imperatively needed. To the end that the best possible results should be obtained, it was necessary that the work of the members of the staff should be coördinated and directed by a master mind.

It was obvious that the man who could undertake such a task with hope of success must combine an unusually broad knowledge of the different branches of laboratory work with a wide acquaintance among scientific investigators, familiarity with cost and sources of supply of books, apparatus, and reagents, sound business judgment, good administrative ability, and hard common sense.

I chose for this important and difficult position Dr. Paul Caspar Freer, then professor of inorganic chemistry in the University of Michigan, and never was man more fortunate in his choice.

Doctor Freer's preliminary scientific training, begun in the United States and completed in Europe, had been exceptionally thorough and broad. He had displayed very distinguished ability as an original investigator and had always been most successful in directing the investigations of others. He had placed his own laboratory at the University of Michigan on a sound basis and had made numerous helpful suggestions calculated to promote efficiency and economy in the work of others of the university laboratories. Incidentally he was the youngest man ever appointed to a full professorship in the University of Michigan. I, myself, had been a student there at the time of his appointment.

Later, when both of us were members of the University faculty, we had repeatedly discussed the possible reorganization and centralization of the laboratory work of the university and had agreed that greatly increased economy and efficiency might readily be secured were some one competent person put in charge with power to act.

When the opportunity came to make a clean start in the Philippines, I felt that Doctor Freer was just the man whom I needed, and having first secured due authority, I offered to him the newly created position of Superintendent of Government Laboratories, at the same time outlining my plans for the future. The opportunity for creative work appealed to Doctor Freer, and to my very great satisfaction he accepted the position. We have profited by his mature knowledge, amazing in its breadth and accuracy.

At the outset he had no thought of permanently abandoning his university career, but requested and obtained a year's leave of absence in order to help us get started. At the end of that year his work was only begun. Mr. Taft, then Civil Governor, secured an extension of his leave for another year, and at the end of this second period successfully urged upon the university regents the almost unprecedented act of granting to a member of the faculty a third consecutive year's leave.

Meanwhile things had been happening here. At the outset Doctor Freer had found himself in the embarrassing situation of being compelled to plan the future buildings, equipment, and personnel of the Bureau of Government Laboratories, and at the same time immediately to provide for the carrying on of urgently necessary routine examinations and original researches.

The new bureau had had small beginnings in a little building, which might without serious inaccuracy be called a shack, situated to the rear of the private residence in which the Civil Hospital had been established. In the cramped, inadequate, and unbearably hot quarters which it afforded, there were inaugurated and carried out scientific investigations of far-reaching practical importance in connection with amœbic dysentery, Asiatic cholera, and bubonic plague. More than one comparatively unknown worker here laid the foundation of an international reputation.

The preparation of plans and estimates for the permanent laboratory building, the completion of lists of necessary scientific books, apparatus, and supplies, and the figuring out of an adequate laboratory staff occupied much of Doctor Freer's time during a period of two years. I speak whereof I know when I say that plans and estimates so complete and accurate as those which he ultimately furnished were never before nor since presented to the legislative body of these Islands.

The aggregate sum of money involved was so large as to make its appropriation at one time inexpedient if not impracticable. Furthermore, it would have been worse than useless to have books and apparatus arriving without a proper place in which to house them, or to employ scientific workers prior to the provision of adequate laboratory accommodations for them. Doctor Freer was, therefore, compelled to give most careful consideration to a scheme for spreading the necessary expenditures over a period of years.

His elaborate plans and estimates proved adequate and final. They were never departed from in any essential particular, so far at least as concerns the work then under contemplation. The only changes which have proved necessary were incident to providing for a large amount of additional scientific work when the scope of the original Bureau of Government Laboratories was added to and its designation was changed to "The Bureau of Science."

After all plans and estimates had been perfected, it was necessary to persuade a legislative body, including in its membership only one lone scientist, to provide the necessary funds. Doctor Freer was naturally required to state why he wanted what he wanted, with the result that he got it.

The work speedily outgrew the little one-story building in which it started. The biological laboratory was transferred to a much larger building on a distant street, and administration was thus complicated.

There was endless delay in the completion of the new building. Grossly exaggerated rumors as to its cost led to the charge that its erection had involved needless and wasteful expenditure. Salaries were necessarily small.

The underpaid members of the Bureau staff were publicly attacked, collectively and in some cases individually, as impracticable and visionary beings, who were devoting their energies to wasting the funds of a poverty-striken government in useless abstract investigations.

One member of the Philippine Commission who had conceived the idea that scientific books were intended only for filing in imposing ranks on the wall, as is done with formidable looking tomes by lawyers of a certain class, for years bitterly assailed every appropriation requested for the Bureau. Through good report and ill Doctor Freer held on his course with clear foresight and unwavering tenacity of purpose, convinced that he should win in the end because he was right. He lived to see this belief abundantly justified!

As the end of his third year of leave approached, he received an ultimatum from the Michigan University authorities to the effect that he must again take up his university work or sever his connection with that institution. An immediate reply by cable was necessary. I asked him to state to me the conditions under which he would be willing to remain in the Insular service, and he did so. No quorum of the Commission was present on that day and, as immediate action was imperative, I stated the facts to four of my colleagues, with a view to obtaining their prior approval. Doctor Freer's proposition was perfectly clear to me and I thought that I made it clear to them. They agreed to accept his offer as they understood it. With a majority of the Commission thus pledged to its acceptance, I informed him that it would *be* accepted, and he then immediately severed his connection with the University of Michigan by cable. A few days later when I requested definite official action by the Commission, I found to my consternation that two of the members with whom I had consulted had failed clearly to understand the terms on which Doctor Freer was willing to remain. When the matter came to a vote my action was not confirmed. I was, therefore, compelled to inform him that he would not be given the salary for which he had stipulated and that the fault of this unfortunate blunder lay entirely with me for the reason that I had failed to submit his proposition to my colleagues in writing and to secure on the face of the document their written approval.

He immediately cabled to ascertain whether he could withdraw his resignation from the faculty of the University of Michigan, but before his message was received his place had been filled.

It is a significant commentary on his character that, although he felt, rightly, that a grave injustice had been done him, he remained loyal both to the man who was primarily responsible for it and to the Government which he served.

With the lapse of time the work conducted under his wise guidance rapidly and steadily developed. The Bureau of Government Laboratories absorbed the Bureau of Mines, took up botany, ornithology, entomology, fisheries, cement testing, and other new lines of investigation, and thus became the Bureau of Science. It furnished its own light, power, steam, and gas so economically that it was required to perform these functions for the College of Medicine and Surgery and for the Philippine General Hospital. These changes meant larger working quarters and a material addition to the power plant, which were provided under Doctor Freer's always competent and efficient direction.

As the volume of research work grew and the necessity for the prompt publication of its results became urgent, the Bureau entered upon the risky venture of beginning the publication of a scientific journal, which must depend for its subject matter upon the results of the work of a limited number of investigators, much of whose time was necessarily occupied by routine examinations. To-day the Philippine Journal of Science is one of the world's standard scientific publications. In it have been published the results of scientific investigations of far-reaching importance. In my opinion, it has done more than any other one thing to spread throughout the world knowledge of work being done in the Philippines for the uplifting of a people and to spread that knowledge among men whose opinion really counts.

The business affairs of the Bureau of Science have been exceptionally involved. It has often been necessary to order apparatus a year or more in advance in order to be sure of having it ready when required. Important book orders have sometimes remained unfilled for years and have had to be repeatedly canceled and re-placed. The Bureau has been dependent in part upon its receipts for money with which to operate and the annual total of such receipts could not be accurately foreseen. It was known to Doctor Freer that deficits would not be approved by the Secretary of the Interior. There have been none.

Scientists of established reputation have strenuously objected to taking civil service examinations and have had to be reasoned with. After arrival at Manila some of them have even more strenuously objected to accounting for their time and have in many ways displayed a desire to be considered in a class by themselves. It has been necessary for Doctor Freer to teach them that they were very much like other people, and would be so considered.

New men have not infrequently desired to reserve for themselves certain fields of investigation which they were not ready immediately to enter and have needed to be inspired with a broader and more truly scientific spirit. Doctor Freer has been peculiarly fortunate in dealing with this too common foible of research men, and the unseemly brawls which so often occur over questions as to who shall do what, and as to priority of results, have been conspicuously absent.

For a long time the Bureau served as a training school for other and wealthier institutions which could afford to buy our employees away from us and did not hesitate to do so. The fight for more adequate salaries was a long and tedious one, but it has achieved important results.

In another particular he has deserved well of the Government. My original plan contemplated a close and helpful relationship between the Bureau of Government Laboratories, a medical college, and a great general hospital. I was told that my scheme was chimerical because three such institutions would never work together harmoniously. This prophecy has proved false. Doctor Freer thoroughly understood the meaning of the word *coöperation,* and on more than one occasion taught it to others, both by precept and example. Under his direction the Bureau of Government Laboratories and its successor, the Bureau of Science, have maintained a helpful relationship with the Bureau of Health and the University of the Philippines.

Doctor Freer may most truly be said to have lived for his work. While he sometimes shortened his afternoon hours sufficiently to make possible the taking of sorely needed exercise, he habitually labored far into the night and on holidays as well. During his last year he had repeated and prolonged attacks of acute suffering. In each such instance he resumed his work before he could rise from his bed. In the course of the last day of his life his thoughts turned again and again to the work and the needs of the Bureau of Science. His relationship to that Bureau may be very briefly summarized. *I* dreamed a dream. *He* made that dream come true. It is not too much to say that he created the Bureau. It will be a lasting monument to his unquestioned scientific and business ability, his clear foresight, his sane judgment, and his unwavering perseverance.

There have not been lacking prophets of evil who have felt that the success of the work of the Bureau of Science was so intimately associated with the peculiar abilities of its director that the Bureau would go to pieces now that his guiding hand has been palsied by death.

It is not to be expected that anyone else could, at the outset, run so complicated a machine with the capable and peculiarly sympathetic touch of the man who built it, but ability to produce a machine which *can* be operated successfully by others determines the value of the builder's work. As the years go by, it will be realized that the constructive work of Doctor Freer for the Bureau of Science has successfully met this, the final test.

PROFESSOR FREER AND THE UNIVERSITY OF THE PHILIPPINES.

By William Everett Musgrave,
Chief of Clinics, Philippine General Hospital.

History records no more complete and unselfish devotion to science than is exemplified in the life of Paul Freer.

He was essentially an investigator and teacher, combining these virtues in such a manner as to make every man who became closely associated with him his pupil. In personality, in the character of his researches, in versatility of mind, in the utilitarian aim of all his work, in his generous attitude of help to all who applied for assistance and advice, and in many other points Professor Freer very closely resembled the illustrious Pasteur.

Pasteur was the father of bacteriology and lived to guide this great science from uncertainty to the road to success. Paul Freer was the father of modern science in the Philippine Islands and he lived to see and guide the developments of his creation to success.

Starting with nothing but a fertile soil and a legislature whose friendly interest was secured and maintained by the untiring activities of the Honorable Dean C. Worcester, he built up a great research institution that to-day is classed with the best in other countries.

During the early years of our residence in this country, he watched the development of elementary education with much interest, and his counsel during these years was a potent influence upon the policy of the Government in educational development.

Educational progress was so satisfactory that in 1905, at its annual meeting, the Philippine Islands Medical Association recommended the establishment of a Medical School. Doctor Freer was chairman of the committee which, with the active co-operation of Mr. Worcester, succeeded in securing satisfactory legislation. "The Philippine Medical School" opened its courses of instruction in 1907, and was merged with the University of the Philippines as the College of Medicine and Surgery in 1909. Doctor Freer was dean and, also, professor of chemistry from the organization of the school until his death, which occurred just five years after the opening of the school and shortly after graduation of the first class of physicians who had taken their entire course of instruction in this institution.

He always stood for high standards in educational work, and it was due largely to his efforts that the College of Medicine and Surgery was able to establish and maintain rigid entrance requirements, a five years' course of instruction, and to secure a faculty of research workers who are paid for teaching. This was no easy task. The public demand for more physicians, the small number of thoroughly prepared students, the limited resources of the Government, and the political exigencies were such that the pressure brought to bear for lower requirements for admission with larger classes, shorter courses of instruction, and less expensive teachers and methods was very strong. Doctor Freer very correctly considered that the stand taken by the Philippine Medical School would determine, for a long time to come, the policy of higher educational methods, and in winning this fight for high standards he not only gained world-wide recognition for our school from the first, but a precedent was established that made a similar policy practicable for other colleges and prepared the way for a University before one was created.

During the first years of our work, while searching the world for suitable teachers for the Medical School, Doctor Freer crippled the efficiency of his own Bureau by furnishing a large proportion of the faculty from the members of the staff of the Bureau of Science. Not only this, but he gave freely of his own time and even diverted funds, as far as practicable within the law, in order to insure the success of the school.

The methods of successful men are always interesting and instructive. Professor Freer's methods were very simple. In dealing with his superiors he usually made a direct request and reënforced this request by a presentation of all the facts bearing upon the subject. If the first effort failed, he would repeat the request until he secured what was wanted or was ordered to desist. In dealing with his colleagues and assistants, his watchword was *efficiency* and all men were judged upon this basis, a very satisfactory method for a man of his broad learning and experience, but a hazardous one for a less experienced leader.

Something of Doctor Freer's conception of the function of a medical school is shown in his Commencement Address to the graduating class in 1910 in which he said:

> The exact training which the graduate of a modern medical school obtains from his work in the various laboratories; the development of his powers of observation by a study of physics, chemistry, bacteriology, pathology; by his contact with the methods of diagnosis and clinical reasoning in the hospital and by the broad phases of hospital discipline which surround him during the final years of his course of study, will have been without meaning if they have not shown him one fundamental fact, that all of this hard work will have been valueless, if he has not had introduced within his being the divine spark of independent thought * * *. If he has not this ambition, his future will be first one of stagnation, then of retrogression. It has been one of the chief missions of the Faculty to cultivate this spirit among the students, and the members of the latter body themselves must be constantly extending their view-points and developing the various special branches to which they are devoting their attention. What is true of the individual members holds good of any institution of learning, a condition of dependence on what is already known and a tendency to look backward into the past is in reality retrogression; and intellectually such an institution must die, no matter how magnificent its buildings, how extensive its equipment, or how generous its means. The teaching force must itself not only be capable of advancing new thought and of developing new methods, but it must utilize these capabilities to the best advantage, continually and restlessly pressing forward to higher ground. Otherwise, the teacher is not capable of inspiring his pupils, he becomes a mere repeater or reciter of text-books, a monitor or supervisor of method which of itself is cast into fixed molds and is already passing toward its end.

Continuing in this same address, our dearly beloved friend and teacher has left us the following advice for the future policy and guidance of the school:

> We must therefore, in the future as in the past, strive to obtain and retain men in the school of the best capability for advancing their own technical specialties. Mere teaching will not do, it lacks that peculiar force which renders the pupils in after life capable of independent development. Mere study on the part of the expectant graduate will also not do. He must continue his scientific growth by observation, thought, study and reasoning from the facts as he finds them to those lying in the higher realms of advance beyond. Faculty and students form the institution as a whole, and it is for them to see that, through the many years of its existence, it continues to play its part in the great advance of human thought as a vigorous entity in the community of schools of learning.

In this last quotation we are given a duty that is made sacred by the martyrdom of him who gave it. The duty is a hard one; no one realized more fully than did Doctor Freer that our greatest difficulty would be to inculcate the spirit of independent thought in our students. Five years of experience has shown that there are local causes, intrinsic and acquired, that make this the greatest problem of our institutions of advanced learning, and the ultimate success of our work depends upon our being able to surmount these difficulties which only may be done by constant effort and the revolutionizing of the customs and practices of centuries.

This is the one phase of our educational development that had not been satisfactory to Doctor Freer, and I bespeak the coöperation of the members of the Faculty to make the appeal contained in his last public utterance to us our watchword for success; and may our efforts not cease until the Paul Caspar Freer Professorship of Chemistry in the University of the Philippines is freely recognized as one of the positions of honor in the scientific world.

DOCTOR FREER AS AN ORGANIZER AND AN ADMINISTRATOR.

By MURRAY BARTLETT,
President of the University of the Philippines.

It is a rare thing when the creative and executive faculties are united in one mind. Rarer even is the combination of scientific genius and business ability.

To see deeply into the laws underlying the mystery of nature, to follow the trace of unknown promise to a successful conclusion, then to apply the practical methods of efficient life to the results of scientific research is seldom achieved by one mind and will. It is this combination of human powers that has made possible the fame of an Edison, a Bell, a Westinghouse. In most cases, men, such as these, use their ability to capitalize for material value the fruits of their scientific investigation.

Doctor Freer was one of these rare men. Undoubtedly he could have devoted his extraordinary ability to amassing a large fortune. Indeed, he had more than one opportunity so to do. He might have erected upon the foundation of his genius for seeing nature's hidden powers a great business organization in his own land for his own enrichment. Instead, he built up about his research and the research of others a great institution for the practical benefit of humanity in a strange and far-away land. The Bureau of Science is, perhaps, not so much a monument to Freer, the Scientist, as to Freer, the Organizer. Truly could one of his friends say, "The Bureau of Science is Freer."

This is why there has been universal testimony to-day that his place can not be filled. If such a statement can be true of any man, it is certainly true of Doctor Freer, for where can be found one, not only preëminent in his own line of study, but familiar with the details of every other phase of scientific investigation; possessing the practical ability of a captain of industry and inspired by a spirit of service for country and for humanity? To say, however, that Doctor Freer's place can not be filled is not to declare that the work of the Bureau of Science can not go on. His task was so well done, so completely organized that, with careful guidance, its many activities may continue unimpaired through the years.

Doctor Freer had all the qualities of a great organizer; untiring industry which keeps no office hours, knowledge of affairs in the broad sense which kept him in touch with the practical needs of the world of trade and commerce, and ability in choosing his assistants. Of these qualities, it is needless to speak. The organization he left behind speaks for him. In treating the subject of Doctor Freer as an organizer and an administrator, I wish to mention the characteristics which were peculiarly his own.

First, he was capable of rare unselfishness where an ideal was to be gained. All the way through, he sacrificed his own time and desire for investigation in order to guide the investigation of others for the good of his Bureau. It was to him a real deprivation to give up his own personal research in a field in which he had few peers and no superiors, yet there was no hesitation on his part in giving freely the results and the credit of his experience to men who were just beginning their scientific investigation.

Nowhere does this unselfishness appear more clearly than in Doctor Freer's relations with the College of which he was the executive head. The Philippine Medical School was very largely the creation of Paul Freer. Its thoroughness of instruction and its high as well as practical standards were made possible by his thorough acquaintance with medical instruction and his extraordinary knowledge of university affairs. He was thoroughly imbued with the idea of founding here, in these Islands, a great Medical College; to provide for the Filipino people a succession of competent physicians and surgeons who should protect and safeguard the health of their race. He had the right to take pride in the success of this institution and to look upon it as his own. When, however, by operation of law the Philippine Medical School ceased to be an independent institution and became a constituent part of the University of the Philippines, he gave the same care, enthusiasm, and loyalty to the College of Medicine and Surgery, although he occupied, what might appear to be, a subordinate position. I sometimes think that I saw the biggest side of Paul Freer—the older man and the younger man, the man of long and rich experience and the man with little. If in future years any credit is given to the work of laying the foundation of this University in its early days, the larger part should be his.

This spirit of unselfishness enabled him to administer his trust, not for the benefit of his own Bureau, but for the larger cause of the Government as a whole, and for its work in these Islands. His outlook was broad and his vision clear. With him the Bureau of Science was simply one means of rendering a service to the Philippine people. His real aim was to make that service as perfect as possible. A favorite phrase with him was "we must play the game." To him, the game was not an opportunity for individual play, but for team work.

In our own relations, the unusual facilities of his Bureau were freely offered to the University, and I believe that in his dealings with other departments of the Government, his attitude was marked by the spirit of true coöperation. Thus he has left behind him a great lesson in administration to those of us who are administrators in this Government. His example entreats us to work not for the conspicuous success of our own Bureaus but for rendering a complete and perfect service by the whole Government.

The University of the Philippines will always revere the memory of Paul Caspar Freer; great as a scientist—greater, perhaps, as an administrator—but greatest of all as a man.

DOCTOR FREER AS A FRIEND OF THE FILIPINOS.

By Fernando Calderon,
Professor of Obstetrics, University of the Philippines.

There are three classes of Americans according to their feelings toward the Filipinos with whom they are in daily contact. First, there are those who maintain an attitude of *absolute indifference* with respect to the future of the Filipino people, when both races should thoroughly know and gladly help each other. These Americans, after spending some time in the Islands, return to the United States without having in any manner coöperated in the improvement of their brothers, the inhabitants of this beautiful Archipelago. Then, here are those who are absorbed by a feeling of *utter selfishness,* and whose sole desire is that this country be converted into a fit place for the satisfaction of their personal ambitions, thus forgetting entirely the economic welfare of the Filipino people. Lastly, there are those noble Americans who have come to the Philippines imbued with a kindly spirit toward the Filipino, whom they treat as brother and friend.

The object of these Americans, who are, after all, the real and proper representatives of the great American nation in the Far East, in coming to these shores, is neither to further their private interest nor to satisfy their greed for wealth, but to fulfil their sacred mission of service and usefulness and to set an example of righteousness to their fellow-countrymen here, so that we may justly call them the standard-bearers of a civilization which is based on the ethical and immutable principles of democracy and on that great ideal of history: the universal brotherhood of man. These are the Americans whose beneficent influence will infuse new ideas and new energies into our institutions and inculcate into the minds of the rising generation that wholesome spirit of democracy which will make the Philippines the most prosperous and progressive country which the world ever beheld in these far-away regions of the extreme Orient. To this group of worthy and self-denying citizens of America the late Dr. Paul C. Freer belongs, whose memory will ever be cherished by those Filipinos who have had opportunity to realize his untiring efforts for the advancement of science in the Philippine Islands.

I need not remind you, of course, to prove my assertion, that Doctor Freer was the one who created and established the Bureau of Science on a scientific basis, helped a great deal in the foundation of the Philippine Medical School and planned this beautiful building, and that he was, perhaps, the principal factor in the construction of that magnificent General Hospital where the College of Medicine and Surgery has its clinics. All of these institutions are admired by visitors and constitute a perennial fountain of blessings upon the Filipino people.

But there is still another feature of his work which deserves notice. Paul Caspar Freer was a solicitous protector of the Filipino youth. It was his desire that young Filipinos should participate directly in the scientific movement which, since the establishment of American government, has been initiated here. For this reason, both government and private students, upon their return from abroad, found the Bureau of Science an adequate field for their studies and the Director, Doctor Freer, a generous adviser who knew how to encourage the spirit of personal initiative and original research.

Paul Caspar Freer also entertained the salutary idea of putting as many Filipinos as possible in his Bureau. On account of this policy, the division of mechanics of the Bureau of Science is at present completely entrusted to Filipinos; and, in the majority of the other divisions, the work of young Filipino graduates is by no means small. Two of them, Messrs. Timoteo Dar Juan and José del Rosario, in the division of chemistry, after graduating in pharmacy from private schools in this city, were asked by Doctor Freer to practise in his office. Later on, Doctor

Freer recommended their being sent to the United States as government students, and now they are instructors in the College of Medicine and Surgery.

This true friendship on Doctor Freer's part toward the Filipinos also manifested itself in the College of Medicine and Surgery, of which he was the Dean. It was a real source of pleasure for him to work with so many Filipino members of the faculty.

In rendering my humble tribute to the memory of that great friend of the Filipinos, allow me to suggest that we, his fellow-workers and admirers, especially his Filipino friends, place a votive tablet on one of the walls of this building, as a sincere token of our enduring appreciation of his disinterested service and as an outward expression of our unswerving admiration of his ideals as a man and a scholar.

PAUL C. FREER, CHEMIST.

By H. D. Gibbs,
Chief of the Division of Organic Chemistry, Bureau of Science, and Associate Professor of Chemistry, University of the Philippines.

In 1887 Paul C. Freer received the degree of doctor of philosophy in Munich. It is astonishing to note the number of great chemists who have received their first inspiration in chemical research in Professor Adolf von Baeyer's laboratory in Munich, and who have absorbed and later radiated the teachings of this great master. This period in v. Baeyer's work was largely devoted to the study of the structure of ring compounds and very soon afterward he published his classic series of articles on the structure of the benzene ring and the reduction of terephthalic acid.[1]

For some years before Doctor Freer received his degree, W. H. Perkin, jr., son of the Perkin who founded the industry of the manufacture of coal tar dyes, had been working in v. Baeyer's laboratory on the synthesis of ring compounds. In 1885 the first part of the article "On the Synthetical Formation of Closed Carbon-Chains"[2] was published. The continuation of this article[3] was published by the joint authorship of Freer and Perkin and was a further study of the construction of the ring compounds from open chains. Parts II and III were published by Perkin alone and in Parts IV and V Freer[4] again appears as the senior author. The work commenced in v. Baeyer's laboratory was later carried on in the laboratory of Professor Dixon, Owens College, Manchester, England.

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[1] *Ann. d. Chem.* (Liebig) (1888), 245, 103; (1889), 251, 257; (1890), 256, 1.

[2] *Journ. Chem. Soc. London* (1885) 47, 801, Part I. On some derivatives of trimethylene.

[3] The synthetical formation of closed carbon-chains, part I (continued). The action of ethylene bromide on the sodium-derivatives of ethylic aceto-acetate, benzoyl-acetate and acetone-dicarboxylate, by P. C. Freer, Ph. D. and W. H. Perkin, jr., Ph. D., *ibid.* (1887), 51, 820.

[4] The synthetical formation of closed carbon-chains, part IV. Some derivatives of hexamethylene, by Paul C. Freer, Ph. D. and W. H. Perkin, jr., Ph. D., *ibid.* (1888), 53, 202; Part V. Experiments on the synthesis of heptamethylene derivatives, by Paul C. Freer, Ph. D. and W. H. Perkin, jr., Ph. D., *ibid.*, 215.

This research with Perkin is a valuable contribution to the knowledge of the tetra, penta, and hexamethylene rings and the derivatives of tetrone, pentone, and hexone. Efforts to synthesize the heptamethylene ring determined that the methods attempted were not feasible.

About this time Doctor Freer was offered a commercial position in the dye manufacturing industry and it became necessary for him to choose between this and an academic career. He chose the latter and, although knowing that the former meant greater financial reward, I know he never regretted his decision.

To my intimate knowledge there are two things which Doctor Freer carried through life as a result of his association in Munich. The first was his intense interest in the discussions of the structure and behavior of the benzene ring. Less than ten days before his death, we were at the Country Club in Baguio discussing some phases of the work described in an article which I had just presented to him for publication in the Philippine Journal of Science, when he enthusiastically said: "This throws more light on the benzene ring. We must further elucidate the structure of the benzene ring." The second was his generosity with his ideas and assistance to the younger chemists. Only we chemists of the Bureau of Science know how much of Doctor Freer's keen mind, inspiration, and editorial ability there is in the chemical articles originating in the Bureau, for his name seldom appears. We know that a person of less lofty ideals, less ability, and more self aggrandizement would have felt himself privileged, at least, to take the credit of a joint authorship in a large proportion of the published chemical research.

The next period of his research, extending from 1887 to 1902 during his residence in America, principally at Ann Arbor, Michigan, was largely concerned with the sodium derivatives of various ketones and aldehydes, their formation and behavior. In 1890 Doctor Freer contributed an important piece of research which did much to settle the mooted question of the constitution of aceto-acetic ether, when he found that acetone, a substance containing no methylene group, was capable of forming a sodium derivative, the reactions of which were similar in nearly every respect to those of sodium aceto-acetic ether. This reaction proved to be a general one shown by other ketones as well as acetic aldehyde.

In 1898 he completed a most interesting piece of work on the constitution of phenylhydrazones. Some of the compounds prepared were very difficult to handle and were made in Michigan during the winter when the thermometer was about 20° below zero. The oxidation of acetone p-bromphenylhydrazone to p-brombenzene azo-isopropylene was especially troublesome, requiring careful handling even at this low temperature, and on several different occasions when our laboratories in the Bureau of Science were unusually warm, Doctor Freer brought up this subject with me and took delight in discussing the difficulties we would experience in trying to produce this reaction in Manila.

During this period, before his arrival in Manila, in addition to the 14 articles on ketones and aldehydes referred to, Doctor Freer also published papers on "The Saponification of Substituted Acetic Ester, Tetrinic Acid, The Constitution of Some Derivatives of Formic Acid, Distillation in Vacuum, Formamide, Jamaica Dogwood, Organic Peroxides, the Action of Acids on Metals, and Halogen Substitution Products of Aliphatic Acids," and two textbooks, one The Elements of Chemistry and the other Descriptive Inorganic General Chemistry. These books are very highly regarded both from a chemical and literary standpoint.

From 1901 to 1912, a period of a little over ten years spent in the Philippines, Doctor Freer found that, on account of his administrative duties in connection with the Bureau of Science and the Medical School, and his editorial work on the Philippine Journal of Science, his personal application to research was impossible, a fact which he regretted deeply. Nevertheless he found time to write a number of articles descriptive of the work of these institutions, and his address given at the commencement exercises of the Philippine Medical School, February 27, 1909, and later published in the Philippine Journal of Science, is an inspiration to all workers in science. His editorial work was most conscientiously performed and I have known him to read many articles three times before the final appearance in print. During the last four years of his life, he developed the keenest interest in the studies of sunlight and sunlight reactions carried on in the Bureau of Science, and through his wide acquaintance and scientific reputation, he obtained the coöperation of various colleagues in America, Europe, Africa, Asia, Australia, and some of the most important islands outside of the Philippine Archipelago. This work was beginning to bear fruit at the time of his death, and he had already published two articles summarizing the results. It promises to throw much light upon several mooted questions concerning sunlight and its effects upon man, and in a few years would have resulted, I believe, in such an indisputable mass of valuable evidence that Doctor Freer and his friends would have regarded it as his crowning achievement.

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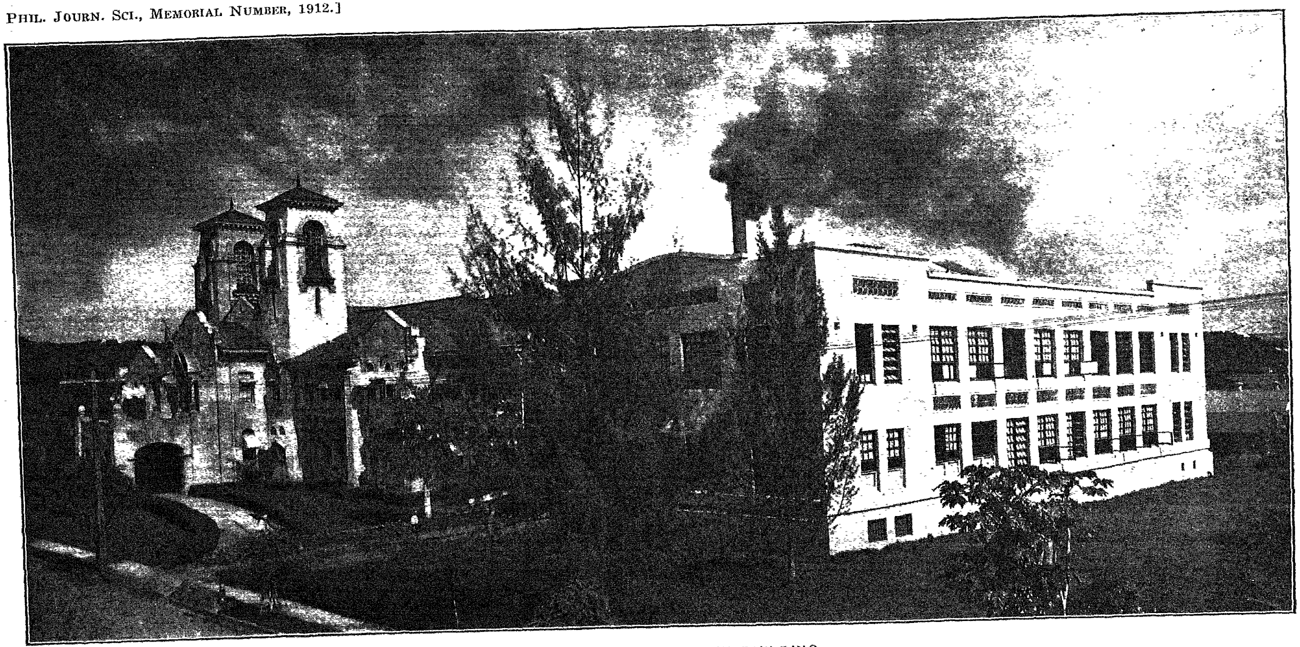

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